SYNOPSIS OF INDIAN MYMARIDAE (HYMENOPTERA: CHALCIDOIDEA)

DISSERTATION

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF

Master of Philosophy

IN

ZOOLOGY

By

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Under the Supervision of

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ALIGARH (INDIA)

2009

Phones { External : 2700920/21-3430
Internal : 3430

DEPARTMENT OF ZOOLOGY
ALIGARH MUSLIM UNIVERSITY
ALIGARH–202002
INDIA

Sections :
1. ENTOMOLOGY
2. FISHERY SCIENCE & AQUACULTURE
3. GENETICS
4. NEMATOLOGY
5. PARASITOLOGY

D. No. ...../ ZD .....

Dated .....

CERTIFICATE

This is to certify that **Ms. Tabassum Rehmat** has completed her dissertation entitled **"Synopsis of Indian Mymaridae (Hymenoptera: Chalcidoidea)"**, under my supervision and guidance. This dissertation contains the original research work, and will be a distinct addition to our knowledge on Indian Mymaridae. I have permitted Ms. Tabassum Rehmat to submit it to the Aligarh Muslim University, Aligarh, in partial fulfillment of the requirements for the award of the degree of **Master of Philosophy**.

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ACKNOWLEDGEMENTS

I wish to express my deep gratitude and sincere regards to my supervisor Dr. (Mrs.) Shoeba Binte Anis, Lecturer, for her able guidance, constant encouragement and constructive suggestions to my dissertation work.

I am especially thankful to Professor Absar Mustafa Khan, Chairman, Department of Zoology, Aligarh Muslim University, Aligarh, for providing all the necessary facilities for carrying out this work.

I owe my immense debt of gratitude to Dr. Mohammad Hayat (retired professor) for his kind suggestions and help. I am also grateful to him for giving me access to the ZDAMU Collections.

I pay my sincere thanks to my respected teachers Dr. Kamil Usmani (Reader) Dr. Ayesha Qamar, Dr. Khowaja Jamal and Mr. Mohammad Amir for their suggestions and help.

I am also thankful to Dr. S.M.A Badaruddin, Dr. Farmanur Rahman Khan and Dr. Banyamuddin, Research Associates for help in preparation of a computer copy of the manuscript and photography respectively. I am immensely thankful to my friends and research scholars in the department for their support, inspiration and help in various ways.

Finally, I acknowledge my parents for being a constant source of inspiration and blessing for me.

Tabassum Rehmat

(Tabassum Rehmat)

Introduction

Members of the family Mymaridae (Hymenoptera: Chalcidoidea) are often referred to as 'fairy flies'. The family Mymaridae is cosmopolitan in distribution and includes the smallest insects measuring not more than 0.35 mm although species of the *Polynema*, *Acmopolynema* and *Gonatocerus* exceed 1 mm in lengths. Its members are abundant and easily collected using a variety of trapping methods like malaise traps, yellow pan traps, and sweep nets, or by rearing from insect eggs collected in the field. Their abundance can be gauged by the fact that a single sweep of a net in the field can yield several of these tiny insects.

Although abundant in nature, taxonomic studies on these insects lacked much behind other chalcidoid families, except possibly the Trichogrammatidae. This is mainly due to their small size, the difficulties associated with study of these insects, and lack of reliable earlier work on the taxonomy of these insects. However, during the last two decades or so this situation has greatly improved with development of improved techniques of collecting and slide mounting.

The family is currently represented by 103 genera and well over 1400 species.

The most important impetus to the taxonomic study of mymarids got from the fact that these insects are exclusively egg parasitoids (oophagous). Biological studies, though limited to a few species, have shown that mymarids parasitize eggs of insects belonging to several orders, notably Hemiptera, Lepidoptera, Coleoptera, Diptera, Orthoptera and Psocoptera (Huber, 1986). Some mymarids parasitize the submerged

eggs of aquatic insects (Dytiscidae: Coleoptera) or eggs laid in an aquatic medium (Odonata) (Mathenson and Crosby, 1912; Jackson, 1966).

This oophagus habit of mymarids, lead to the recognition as potential agents in the biocontrol of insect pests. Although egg parasitoids have often been considered as unsuitable for biological control programs, mymarids and trichogrammatids (another exclusively oophagus family of the Chalcidoidea) are often used for biocontrol of insect pests. For example, the Australian species, *Anaphes nitens* (Girault), was used successfully to control *Gonipterus scutellus* Gyllanhal (Coleoptera: Curculionidae), a pest of Eucalyptus in South Africa (DeBach and Rosen 1991, as *Patasson nitens*) and in other countries.

In spite of considerable progress made in the Taxonomic and phylogenetic studies on the world Mymaridae (Huber, 1986; Triapitsyn, 2001; Schauff, 1984) resulting, as noted above, in the establishment of 103 genera and 1400 species worldwide, the situation on the Indian fauna deserved attention. This family is represented in India by 24 genera, including one genus recorded in this work (23% of world fauna), but the number of species is negligible, only 110 species forming 8.4 % of world fauna. Only two or three genera were studied in detail. For instance, revision of *Gonatocerus* by Zeya & Hayat (1995), and revision of Oriental *Acmopolynema* by Triapitsyn & Berezovskiy (2007).

The recent collecting of several thousands of mymarid specimens especially from the north and north-eastern States of India, prompted the author to take up detail taxonomic studies on this relatively poorly studied group. These collections yielded species belonging to at least 15 genera. However, in the present dissertation only the

following 7 genera are considered: *Alaptus*, *Camptoptera,* *Eubronchus*, *Himopolynema*, *Litus*, *Pseudanaphes,* and *Stethynium*.

The present dissertation deals of 7 genera and 14 species, of which the genus *Pseudanaphes* is a new record from India. Also 4 new species are described and 1 species of *Camptoptera* recorded for the first time, and 9 known species are recorded. The genera are diagnosed and the species are either described (new species) or redescribed (known species) and all the species are illustrated by photographs. Also to make the genera identifiable, a key to the Indian genera and keys to the species of the genera *Camptoptera*, *Himopolynema* and *Alaptus* are given.

Historical Review of the Family Mymaridae

Review of World literature

The family Mymaridae was studied as early as the 19th Century by Walker and Foerster together with their contribution to other chalcidoid families. A detailed review of the world Mymaridae, including a list of valid genera and number of species known from all the zoo-geographical regions, was given by Huber (1986). It may be noted that during the last 25 years tremendous progress has been made, but mainly on the Nearctic and Neotropical fauna of Mymaridae. However, it may be mentioned that the first major contribution was the review of the world Mymaridae, with a key to the genera considered valid at that time by Annecke and Doutt (1961). After this publication, several generic reviews, keys to genera, and catalogues were published, but without exception these publications are restricted to some zoo-geographical region or even countries. None of the publications deal with the world Mymaridae.

Subba Rao & Hayat (1983) - Oriental genera and a species catalogue.

Schauff (1984) - Holarctic genera and phylogenetic (Cladistic) analysis of these genera.

Subba Rao & Hayat (1985) - Key to genera of the Indian subcontinent.

Subba Rao & Hayat (1986) - Catalogue of Mymaridae from Indian subcontinent.

Noyes & Valentine (1989) - New Zealand genera and species.

Yoshimoto (1990) - New world genera, diagnosis, keys.

Huber (1997) - Nearctic genera, key.

Triapitsyn & Huber (2000) - Palaearctic genera.

Lin, Huber & La Salle (2007) - Australian genera.

In addition to the above mentioned generic reviews, keys and catalogues, the following recent publications on revision or review of some genera or groups of genera deserve notice.

1. Review of the world species of *Stephanodes* by Huber & Fidalgo (1998).
2. Review of species of *Palaeoneura* (there as *Chaetomymar*) by Huber (2002).
3. Revision of Oriental and Australian *Acmopolynema* by Triapitsyn & Berezovskiy (2007).
4. Revision of mainly Nearctic species of *Erythmelus* by Triapitsyn, Berezovskiy, Hoddle & Morse (2007).

Review of the Indian Literature

The first species of Mymaridae to be described from India was *Alaptus magnanimus* Annandale (1909), followed by Kieffer's (1913) description of *Gonatocerus longicrus*. Mani's (1938) catalogue lists only 3 species of Mymaridae from India. After a long gap of nearly 28 years after Kieffer's publication, Mani (1942) described two new species of *Alaptus* and one species of *Mymar*. Later, in the 1950's and 1960's some contribution were made by Subba Rao (1966), Subba Rao & Kaur (1959, 1960), Narayanan, Subba Rao & Kaur (1960), Narayanan & Subba Rao (1961), and Narayanan (1961).

Mani & Saraswat (1973) described several species, mainly in the genera *Gonatocerus* and *Polynema*. In two separate paper (1978a, b) Viggiani described species of *Camptoptera* and *Eofoersteria* from India.

Mani (1989) published in the ZSI, fauna volume on Mymaridae together with other Chalcidoidea. Simultaneously, Subba Rao (1989) described a large number of species in several genera, but mainly *Acmopolynema*, *Gonatocerus* and *Camptoptera*, and recorded *Dicopomorpha* (as *Dicopulus*) for the first time from India. In the 1990's major contributions to the Indian Mymaridae were made by Hayat (1992), on several genera; Zeya & Hayat (1995), on a revision of Indian *Gonatocerus*; and Hayat & Anis (1999a, b, c) on *Acmopolynema*, *Polynema* and recorded *Ptilomymar* and *Himopolynema* for the first time from India. These were followed by description of a species of *Polynema* by Hayat & Singh (2001), and three species of *Himopolynema* by Hayat, Basha & Singh (2003). In 2003, Narendran, Hayat & Sinu, recorded the genus *Australomymar* from India and described one species. Recently, Rehmat, Anis & Hayat (2009) recorded the genus *Litus* from India and described two species; and Hayat & F. R. Khan (2009) recorded the genus *Eubroncus* from India and described one species.

Classification of Family Mymaridae

The classification of the family Mymaridae is as yet an unresolved problem as whatever has been published in recent years (for example Schauff, 1984.) does not take into account all the known world genera.

Basically there are two systems of classifying Mymaridae into subfamilies and tribes. One in which the family was divided into two subfamilies based on the number of tarsal segments (Ashmead, 1904): pentamerous Gonatocerinae and tetramerous Mymarinae. Further each one of these subfamilies was divided into two tribes based on a sessile gaster (petiole broadly attached to gaster so that the mesopostphragma clearly project into gaster), and petiolate gaster (petiole narrow, sometimes tubular, so that the mesopostphragma reaches at most to apex of the propodeum).

Girault (1929), on the other hand, divided Mymaridae into two subfamilies, Alaptinae and Mymarinae, on the basis of the sessile or petiolate gaster. Each one of these subfamilies was further divided into two tribes based on the pentamerous or tetramerous tarsi; pentamerous Alaptini and tetramerous Anagrini (in Alaptinae), and pentamerous Ooctonini and tetramerous Mymarini (in Mymarinae). Annecke and Doutt (1961) added one more tribe, Anaphini, to the Mymarinae.

Yoshimoto, Kozlov & Trjapitzin (1972) proposed the subfamily Eubroncinae.

There are some publications, which are now only of historical value, which considered mymarids in a superfamily or elevate some subfamilies to family ranks. For instance, Ghesquière (1942) elevated mymarids to superfamily, Mymaroidea, and included the families Mymaridae, Lymaenonidae and Signiphoridae. The later is now

regarded as a family related to the Aphelinidae. Soyka (1949) elevated Alaptinae to Alaptidae. Debauche (1948) placed the genus *Mymaromma* Girault in a separate family, Mymarommidae (correct name, Mymarommatidae), which is accepted by later authors.

Schauff's (1984) phylogenetic (cladistic) analysis of the Holoarctic genera lead him to abandon divisions of Mymaridae into subfamilies and placed the genera into generic-groups. This approach was adapted by Noyes & Valentine (1989) and more recently in a review of the Australian genera by Lin, Huber & La Salle (2007).

The 24 Indian genera are grouped into the following generic groups. Brief diagnosis in each species group is given by Lin et al. (2007), and therefore the present author refrains from reproducing the diagnosis given by these authors:

Genera with 5-segmented tarsi:

Gonatocerus group – Indian genus: *Gonatocerus*

Ooctonus group – Indian genus: *Ooctonus*

Arescon group – Indian genus: *Arescon*

Camptoptera group – Indian genera: *Camptoptera, Eofoersteria, Ptilomymar*

Alaptus group – Indian genera: *Alaptus, Dicopomorpha, Litus*

Genera with 4- segmented tarsi:

Anagroidea group – Indian genera: *Anagroidea, Eubronchus*

Polynema group – Indian genera: *Acmopolynema, Himopolynema, Mymar, Narayanella, Paleaeoneura, Polynema, Stephanodes.*

Anagrus group – Indian genera: *Anagrus, Stethynium*

Anaphes group – Indian genera: *Anaphes, Erythmelus, Pseudanaphes*

Australomymar group – Indian genus: *Australomymar*

Material and Methods

A. Material

The present study is based on a large number of mymarid specimens collected mainly during the last three years from the northern and north-eastern States of India. In addition to those the author has also studied types and determined material of some species present in the ZDAMU collection.

B. Methodology

Collecting

Mymarid specimens were collected by a sweep net. The insects collected in the net were sucked in an aspirator and killed in ethyl acetate fumes. Some specimens were directly transferred from the net to 80% alcohol. In either case, before proceeding further the specimens were sorted to genera. For correct identification of these small-sized mymarids, it is necessary to either mount these on cards or on sides. It is almost impossible to identify specimens to correct species if the specimens are in alcohol; if the specimens are very small (0.35-0.50 mm), then it is necessary to mount them on slides.

Preparation of card mounts

The procedure given by Noyes (1982) was adapted for card mounting of specimens. The procedure mainly consists of attaching the specimen via the thorax on a rectangular card (14 x 5mm) using any water soluble glue. Care was taken to see that the antennae, wings and legs are free, and the body is attached through the pleural region of the thorax.

Preparation of slide mounts

The procedure given by Noyes (1982) is adopted for slide preparation. Noyes (1982) method for slide preparation was preferred here over other methods as it has double advantage of clearing the specimen so as to make it possible to see all the details of setation and sculpture, and internal structures like the ovipositor.

Depending on the number of specimens available, one to several slides were prepared for each species. However, when only a single specimen of a species was available this was dissected and mounted on a slide after the body colour and other details has been recorded.

Briefly stated this procedure consists of the following steps. It should be noted that the specimens should be on card.

1. Wings were removed with the help of a fine needle and placed in a small drop of Canada balsam as shown in Figure 1.
2. The antennae were knocked off and attached to the side of the thorax with a small quantity of Canada balsam. The head was knocked off and attached to the thorax with a small quantity of Canada balsam.
3. The specimen was transferred to a small quantity 10% KOH. In a short time the specimen frees from the card and sinks to the bottom of the cavity block.

   It is kept in KOH for 48 hours at room temperature. If the specimen is to be processed quickly then the block is placed in thermostat at 95-98 °C for 10 minutes.
4. After 48 hours (or 10 minutes at 95-98 °C), the KOH is pipitted off, and the specimen was passed through (for 10 minutes each) glacial acetic acid,

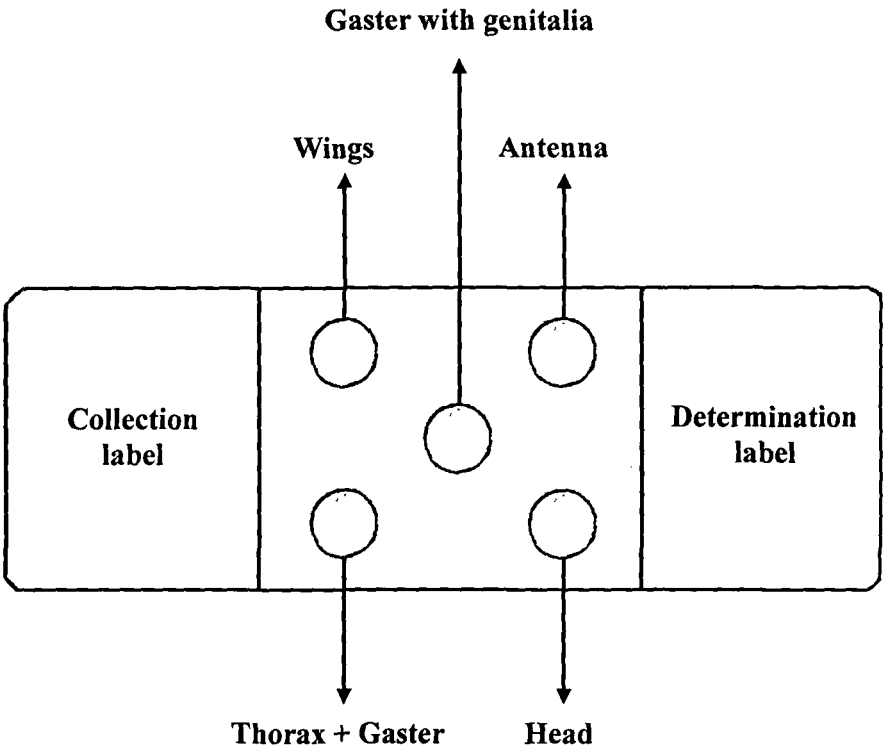

Fig. 1. Arrangement of body parts mounted on slide

distilled water and equal amount of distilled water and 80% alcohol. Then the specimen was dehydrated in ascending grades of alcohol (80%, 90%, 96%, absolute alcohol) for 10 minutes in each grade. Then the specimen was passed through a mixture of absolute alcohol and oil of cloves, and finally cleared in oil of cloves.

5. The specimen is then removed from oil of clove and various parts arranged on the slide as shown in Figure. 1.
6. The slide is allowed to dry for about two weeks, and then coverslips were placed on the parts. The slide is then allowed to dry for another two weeks in a thermostat at 40°C.

Photography

Digital images were made from slide mounted parts using a Nikon E8400 Digital camera and Kodak Easyshare M753 zoom Digital camera. The images were transferred to a computer.

Measurements

Relative measurements of various body parts were made from the slide preparations with the help of an ocular micrometer having a linear scale of 100 divisions, placed in the eye piece of a compound microscope.

Measurements of various body parts from carded specimens were made from the card mount with the help of a calibrated linear scale ocular micrometer, placed in the eye piece of a binocular microscope.

C. ABBREVIATIONS

BMNH - The Natural History Museum, London, U.K.

NPCI - National Pusa Collections, Division of Entomology, Indian Agricultural Research Institute, New Delhi, India.

USNM - United States National Museum of Natural History, Washington D.C., U.S.A.

ZDAMU - Department of Zoology, Aligarh Muslim University, Aligarh, India.

D. TERMS AND MEASUREMENTS

The terminology used in the present work for various body parts is evident from Figures 2-8.

The following abbreviations for various body parts were used in the text.

Head

HW = Maximum width of head in front view.

HL = Length from occipital area to mouth margin.

FVW = Minimum width of fronto-vertex in front view of head.

DBT = Distance between toruli.

MDL Length of mandibles.

LVR = Length of vertex.

TMMD = Distance between torulus and mouth margin.

TL = Maximum diameter of torulus.

EL = Maximum eye length, measured with the head in front view.

CPW = Clypeus width.

MSL = Malar space length. It is minimum distance from lower *eye margin*

to mouth margin.

Min.

FVW = Minimum frontovertex width.

Antenna

SCL = Length of scape.

SCW = Width of scape.

PL = Length of pedicel.

PW = Width of pedicel.

FnL = Length of funicle.

FL = Length of funicle segments.

FW = Width of funicle segments.

CLL = Length of clava.

CLW = Width of clava.

Thorax

THL = Length of thorax measured along midline from anterior margin of pronotum to posterior margin of propodeum.

THW = Width of thorax measured along tagulae.

PNL = Length of pronotum.

PNW = Width of pronotum.

MSTL= Length of mid lobe of mesoscutum, measured along midline from anterior margin to posterior margin.

MSTW= Width of mid lobe of mesoscutum.

SCTL = Length of scutellum, measured along midline from anterior margin of anterior scutellum to posterior margin of posterior scutellum.

SCTW= Width of scutellum

PDL = Length of propodeum, measured along midline in dorsal view.

PEL = Petiole length

Wings

FWL = Forewing length, measured from base (at level of humeral plate) to apex.

FWW = Forewing width, measured across the widest part of disc.

FFL = Length of marginal fringe of fore wing; the longest cilium/ cilia of the marginal fringe along posterior margin of the disc.

HWL = Hind wing length.

HWW = Hind wing width, measured across the widest part, which is usually half way between hamuli and apex of disc.

HFL = Length of marginal fringe of hind wing; the longest cilium/ cilia of the fringe along posterior margin of disc.

Legs

FFm = Length of fore femur, excluding trochantellus.

FTb = Total length of fore tibia.

FTrs = Length of fore tarsus.

FBstr = Maximum length of fore basitarsus.

MFm = Length of mid femur excluding trochantellus.

MTb = Total length of mid tibia.

MTrs = Length of mid tarsus.

MBstr = Maximum length of mid basitarsus.

HTb = Total length of hind tibia.

HTrs = Length of hind tarsus.

HBstr = Maximum length of hind basitarsus.

Trs = Tarsal segments.

Gaster

GSTL = Length of gaster, measured from base of TI to apex of last tergite.

GSTW = Maximum width of gaster.

OVPL = Length of ovipositor, measured from the base of second valvifer to the apex of third valvula.

EXS.OVL = Length of exserted ovipositor.

TI- TVII = Tergites of gaster.

Key to Indian genera of Mymaridae, females.

1. Tarsi 5 segmented, tarsal formula 5-5-5 2

-. Tarsi 4 segmented, tarsal formula 4-4-4 8

2. Gaster sessile or subsessile; mesophragma plainly projecting into gaster 3

-. Gaster distinctly petiolate (petiole of variable length); mesophragma not projecting into gaster 5

3. Funicle 5-segmented; hind margin of fore wing excised beneath venation (scutellum and postscutellum not strongly sculptured) ..... ***Alaptus*** Westwood

-. Funicle 6- or 7-segmented; hind margin of fore wing convexly rounded, not excised 4

4. Funicle 6-segmented, F2 at least as long as F1; mesoscutum, postscutellum and propodeum strongly sculptured ..... ***Litus*** Haliday

-. Funicle 7-segmented, F2 shorter than F1 and F3; mesoscutum, postscutellum and propodeum not strongly sculptured ..... ***Dicopomorpha*** Ogloblin

5. Funicle 8-segmented; fore wings generally broad 6

-. Funicle at most 7-segmented; fore wings generally narrow 7

6. Head with sub-antennal groove between torulus and mouth margin; pronotum divided medially; propodeum smooth or with longitudinal submedian carinae;

hypochaeta of marginal vein located mid way between proximal and distal macrochaeta ..... ***Gonatocerus*** Nees

-. Head without sub-antennal groove; pronotum entire; propodeum with carinae; hypochaeta much closer to proximal macrochaeta than to distal macrochaeta .... ***Ooctonus*** Haliday

7. Funicle 5-segmented, clava solid or with 2-3 segments; fore wing relatively broad; marginal vein greatly elongated, the venation reaching to more than half the length of the wing ..... ***Arescon*** Walker

-. Funicle 7-segmented, majority of the species have F2 ring like (likely to be overlooked); fore wing narrow and distinctly curved at apex; marginal vein short, venation not extending beyond basal third of wing ..... ***Camptoptera*** Foerster

8. Funicle 8-segmented; propodeum with a pair of submedian, translucent areolate carinae; tergum I of gaster with lateral or sublateral pair of translucent, areolate carinae ..... ***Ptilomymar*** Annecke & Doutt

-. Funicle at most 6-segmented; propodeum and gaster without such carinae 9

9. Gaster sessile or subsessile, mesophragma plainly projecting into gaster; scutellum usually divided into anterior and posterior parts 10

-. Gaster petiolate, mesophragma not projecting into gaster; scutellum not clearly divided into anterior and posterior parts 16

10. Posterior scutellum divided longitudinally by a suture 11

-. Posterior scutellum entire, not divided longitudinally by a suture 12

11. Antennal clava solid ..... ***Anagrus*** Haliday

-. Antennal clava 3-segmented, the sutures strongly oblique ..... ***Stethynium*** Enock

12. Clava solid 13

-. Clava 2- or 3- segmented 15

13. Fore wing venation reaching at least to half the length of the wing (as in *Arescon*); ovipositor distinctly exserted, often as long as or longer than gaster ..... ***Australomymar*** Girault

-. Fore wing venation not more than one-third the length of wing; ovipositor variable 14

14. Hypopygium short, not extending to apex of gaster; head in lateral view relatively thick, the gena relatively wide so that the posterior margin of eye separated along entire length from back of head; mandibles normal, crossing medially and with three teeth; body usually black or dark brown ..... ***Anaphes*** Haliday

-. Hypopygium well developed, extending almost to apex of gaster; head in lateral view thin, the gena very narrow so that the posterior margin of eye, at least dorsally, touching back of head; mandibles minute, not meeting medially and apparently without teeth; body usually yellow or light brown ..... ***Erythmelus*** Enock

15. Clava 2-segmented ..... ***Anaphes*** Haliday

-. Clava 3-segmented (Fore wing with a curved dark infuscate band behind venation and relatively long marginal fringe) ..... ***Pseudanaphes*** Noyes & Valentine

16. Body minute (about 0.3mm); fore wing very narrow, slightly but distinctly curved at apex as in *Camptoptera*; mandible with one tooth ..... ***Eofoersteria*** Mathot

-. Body longer (usually more than 0.5mm); fore wing usually broader and not curved at apex 17

17. Mandibles pointed ventrally, not crossing each other medially; hind wing relatively broad with rounded apex 18

-. Mandible normally articulated, crossing each other medially; hind wing with relatively narrow apex 19

18. Head in lateral view only slightly triangular, not longer than high with small projection between toruli; mandibles not longer than width of mouth opening; antenna double geniculate and first funicle segment longer than any other segment and about as long as pedicel ..... ***Anagroidea*** Girault

-. Head in lateral view strongly and sharply triangular, much longer than high and with large, distinct shelf projecting between toruli; mandible at least as long as width of mouth opening; antenna not double geniculate and funicle segment 1 shortest of all segments and shorter than pedicel .....
..... ***Eubroncus*** Yoshimoto, Kozlov & Trjapitzin

19. Fore wing very narrow, oar-shaped, with a long narrow petiolate basal half or more, and short, oval, partly infuscate blade; hind wing filamentous; anennal scape constricted medially ..... ***Mymar*** Curtis

-. Fore wing not oar-shaped; hind wing not filamentous (sometimes membrane very narrow); antennal scape not constricted medially 20

20. Discal setae on fore wing arranged in curved and alternating strong and weak rows; hind leg with very long spine-like setae; last segment of funicle like a segment of clava ..... ***Narayanella*** Subba Rao

-. Fore wing with discal setae not arranged in curved rows; hind leg with normal setae; last segment of funicle not like a segment of clava 21

21. Petiole attached to gastral tergum 22

-. Petiole attached to gastral sternum 24

22. Face with small pit submedially next to each torulus; propodeum with a mid-longitudinal furrow or canal ..... ***Himopolynema*** Taguchi

-. Face without a pit next to each torulus; propodeum without such a furrow or canal 23

23. Fore wing usually narrow and often slightly narrower beyond venation, propodeum smooth, without carinae; pro- and mesothorax with enlarged and blunt or cuspidate setae ..... ***Palaeoneura*** Waterhouse

Fore wing usually wider just beyond apex of venation; propodeum with at least an incomplete median carina; pro- and mesothoracic setae usually normal, neither blunt nor cuspidate at apices ..... ***Polynema*** Haliday

24. Antennal scape with imbricate, rasp-like sculpture on inner surface; vertex with a wide, shallow depression outside each ocellus; prothoracic spiracles placed near anterior apex of notauli; propodeum without carinae ..... ***Staphanodes*** Enock

Antennal scape without imbricate, rasp-like sculpture but with cross-ridges on inner surface; vertex without such depressions outside each ocellus; prothoracic spiracles, as usual, as usual, at postero-lateral angle of pronotum; propodeum with a median V-shaped carina ..... ***Acmopolynema*** Ogloblin

1. Genus *Alaptus* Westwood

Alaptus Westwood, 1839: 79. Type species *Alaptus minimus* Westwood, by monotypy.

Parvulinus Mercet, 1912: 332. Type species *Parvulinus auranti* Mercet, by monotypy. Synonymy by Girault (1913).

Metalaptus Meleonotti, 1917: 339. Type species *Metalaptus torquatus* Malenotti, by monotypy. Synonymy by Girault (1917).

Diagnosis

Female. Antenna 8-segmented, formula 1,1,5,1. Thorax with mesophragma highly developed and extended deeply into gaster. Fore wing with posterior margin behind venation usually deeply and abruptly excised and its hind margin usually straight so that the fore wing beyond basal excision widens evenly and continuously towards wing apex. Tarsal formula 5-5-5. Gaster sessile

Male. Similar to female, except for the genitalia and antenna. Antenna filiform; flagellum 8-segmented.

Hosts. Eggs of Psocoptera.

Species and distribution. Worldwide, about 60. Four species from India.

1. ***Alaptus jowainus*** sp.nov.

(Figures 9-15)

Description

Female (Holotype) (Fig. 15). Body brown to dark brown. Antenna brown except pedicel and scape light brown. Fore wing hyaline slightly infuscate at base (below venation). Hind wing with patchy infuscation; vein brown. Legs brown; tarsal segments light brown.

Head (Fig.9). Mandible dark brown, unidentate. Transverse striations on occipital area. Scape striated; pedicel shorter than scape (16:23); funicle 5-segmented; F2 longest; clava with 2 longitudinal sensilla (Fig. 10).

Thorax (Fig. 13). Pronotum not visible in dorsal view; mid lobe of mesoscutum with transverse reticulations and with 1+1 setae, each side lobe with one seta; lateral part of scutellum with a few longitudinal striations; propodeum smooth with median length 0.26x of scutellum length (8:30). Fore wing (Figs. 11, 12) 12.2x as long as broad (147:12) with 4-5 discal setae beyond venation, marginal fringe about half of wing width. Legs normal; fore femur smaller then hind femur (45:52).

Gaster (Figs.14, 15). Longer than thorax (68:58); ovipositor originates from the end of tergite second (TII) of gaster, and exserted at apex; exserted part of ovipositor 0.20x of gaster length. Ovipositor 1.14x as long as mid tibia.

Relative measurements (Slide). ELV 36; HW 60; EL 21; TL 5; TMMD 10; DBT 14; SL 20.5; SW 8; PL 16; PW 8; CLL 40; CLW 9; F1L 9; F1W 4; F2L 12; F2W 4; F3L 9; F3W 5; F4L 10; F4W 5; F5L 10; F5W 5; THL 58; THW 42; MSTL 21; MSTW 46;

SCTL 30; SCTW 38; PDL 8; FWL 147; FWW 12; FFL 72; HWL 148; HWW 7; HFL 65; MFm 45; FTb 33; MTb 48; HTb 45; FBstr 10.5 MBstr 13; GSTL 68; GSTW 62; OVPL 55; Exs.OVPL 14.

Male. Unknown.

Hosts. Unknown.

Material examined. Holotype ♀ (on slide under 3 coverslips): INDIA: MEGHALAYA: Jowai, Thaldskin; 22.x.2008; Coll. F.R.Khan. (ZDAMU).

Distribution. INDIA: Meghalaya.

Comments. This new species is close to *Alaptus delhiensis*, but differs from that species by the character given in the key.

Key to Indian species of *Alaptus*, females*

1. Antenna with funicle segments short, broader than long to at most quadratic; clava longer than funicle ..... **1. *delhiensis***
-. Antenna with funicle segment, except, F1, at least slightly longer than broad; clava at most as long as F2-5 combined 2
2. F1 quadratic, F2-5 each slightly longer than broad; clava as long as F2-5 combined ..... **2. *ramakrishnai***
-. F1-5 distinctly longer than broad, F1 about 2x, and F5 about 1.5x as long as broad; clava shorter than F2-5 combined ..... **3. *jowainus*** sp. nov.

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* *Alaptus magnininus* Annandale (1909) is based on a male.

2. Genus *Camptoptera* Foerster

Camptoptera Foerster, 1856: 116, 119, 144. Type species *Camptoptera papaveris* Foerster, by monotypy.

Pteroclisis Forster, 1856: 144. Unnecessary replacement name for *Camptoptera.*

Stichothrix Forster 1856: 117,118,121. Type species *Stichothrix cardui* Foerster, by monotypy. Synonymy by Annecke & Doutt (1961).

Eomymar Perkins, 1912: 26. Type species *Eomymar muiri* Perkins, by monotypy. Synonymy by Huber & Lin (1999).

Congolia Ghesquiere, 1942: 320. Type species *Congolia sycophila* Ghesquiere, by original designation. Synonymy by Debauche (1949).

Sphegilla Debauche, 1948: 62 Type species *Sphegilla franciscae* Debauche, by original designation. Synonymy by Yoshimoto (1990).

Camptoptera (*Zemicamptoptera*) Ogloblin & Annecke, 1961: 24. Type species: *Camptoptera* (*Zemicamptoptera*) *semialbata* Ogloblin & Annecke, by original designation.

Wertanekiella Soyka, 1961: 87. Type species *Wertanekiella brevicornis* Soyka, by original designation. Synonymy with *Sphegilla* by Mathot (1969).

Staneria Mathot, 1966: 214. Type species *Staneria diademata* Mathot, by original designation. Synonymy by Huber & Lin (1999).

Camptoptera Foerster: Annecke & Doutt, 1961: 15. Soyka, 1961: 73. Schauff, 1984: 39. Noyes & Valentine, 1989: 29. Yoshimoto, 1990: 32. Huber & Lin, 1999: 27.

Diagnosis

Female. Antenna 9 or 10 segmented, formula 1,1,6,1 or 1,1,7,1; funicle with F2 usually ring like. Mandible with one tooth. Each axilla with one long seta;

mesophragma not extending into gaster; propodeum at least half as long as scutellum. Fore wing narrow, with posterior margin almost always concave, giving the wing a distinctly curved apex; disc with 1-4 rows of setae; marginal vein short; venation not extending beyond basal third of wing. Tarsal formula, 5-5-5.

Male. Flagellum 9- segmented with F2 and F4 ring-like in a 10- segmented flagellum, or all flagellar segments of normal length in a 9-segmented flagellum.

Hosts. Eggs of Scolytidae and Buprestidae, and possibly Cicadellidae, Aleyrodidae & Thripidae.

Species and distribution. 76 species recorded from Nearctic, Neotropical, Palaearctic, Ethiopian, Australian and Oriental regions. Nine species from India.

1. *Camptoptera hayati* sp. nov.

(Figures 16-18)

Description

Female (Holotype) (Fig. 18). Body light brown. Mandibles dark brown. Antenna light brown. Fore wing infuscate at base, apical part hyaline. Hind wing slightly infuscate. Legs whitish.

Head. Transverse striations on occipital area; mandible unidentate. Antenna with F3 longest; F1equal to F6; F1, F4 and F5 almost equal in length; clava with one sensillum as in Fig.16A.

Thorax (Fig. 17). Thorax longer than gaster, about 1.18x of gaster length. Pronotum not visible in dorsal view of thorax; mesoscutum almost half of the scutellum length (15:27); notauli incomplete; middle of scutellum with V-shaped

longitudinal sculpture meeting each other and anterior scutellum with transverse striations. Fore wing (Fig. 16B) with 10-13 setae in a row. Hind wing about 27x as long as broad.

Petiole with lateral projections as in Fig. 18.

Gaster (Fig. 18). Gaster shorter than thorax, about 0.84x of thorax length. Ovipositor not exserted.

Relative measurements (slide): HL 30; EL 21; TL 4; TMMD 13; SL 17; SW 6; FNL 65; CLL31; F1L 11; F2L 1; F3L 12; F4L 9; F5L 10; F6L 11; F7L 10; THL 57; MSTL 15; SCTL 27; FWL 143; FWW 7.5; FFL 55; HWL 135; HWW 5; HFL 45; HTb 50; HBstr 13; PEL 14; GSTL 48; OVL 29.

Male. Unknown

Hosts. Unknown

Distribution. India: Assam.

Material examined. Holotype ♀ (on slide; pedicels missing); INDIA: ASSAM: Guwahati, Borkusi; 28.x.2008; coll. F.R.Khan (ZDAMU).

Comments. This new species is close to *C. dravida* Subba Rao (1989), but differs from that species in several characters such as the sculpture; body colour; dimensions of funicle segments and fore wing.

2. *Camptoptera assamensis* sp. nov.

(Figures 19-24)

Description

Female (Holotype). Body dark brown. Antenna light brown except scape with proximal part dark brown; F6, F7 and clava dark brown. Fore wing and hind wing

infuscate at base. Posterior part of gaster dark brown. Legs yellow excluding coxae light brown.

Head (Fig. 22). Transverse reticulation on occipital area. Pedicel short, about 0.83x of F1 length; F1 longest; F6 and F7 equal in length (Fig. 19).

Thorax (Fig. 22). Pronotum not visible in dorsal view of thorax; thorax longer than gaster, about 1.22x of gaster length; mesoscutum with scale-like reticulations except posterior part with longitudinal cells; posterior scutellum reticulate, middle to posterior part with longitudinal cells as in figures 22; propodeum with two carinae. Fore wing (Fig. 20) with 7 discal seta in a row, about 20.6x as long as broad. Hind wing (Fig. 21) 30x as long as broad.

Petiole (Fig. 24) with lateral projections.

Gaster (Fig. 24). Gaster shorter than thorax, about 0.8x of gaster length.

Relative measurements (slide): (Dorsal) HW 45; SL 18; SW 4; PL 10; PW 7; FNL45; CLL 25; F1L 12; F2L 1; F3L 11; F4L 9; F5L 9; F6L 10; F7L 10; THL 55; TRW 38; MSTL 13; SCTL 25; PDL 28; FWL 124; FWW 6; FFL 44; HWL 120; HWW 4; HFL 36; FTb 25; FBstr 10; MTb 42; HTb 44; HBstr 10; PTL 7; GSTL 45; OVL 14.

Male. Unknown.

Hosts. Unknown.

Distribution. India: Guwahati.

Material examined. Holotype ♀ (on slide); INDIA: ASSAM: Guwahati, Amingaon; 29.x.2008; coll. F.R.Khan (ZDAMU).

Comments. This new species very close to *C. philipina* but differ in sculpture and body coloration.

3. *Camptoptera sakaii* Taguchi

(Figures 25-29)

Camptoptera sakaii Taguchi, 1977b: 143-146, female. Taiwan, Kenting Park.

Redescription

Female. Body dark brown. Antenna light brown except scape and pedicel honey yellow. Fore wing infuscate at base particularly a triangular patch near stigmal vein. Hind wing infuscate. Legs yellowish brown.

Head. Transverse reticulations on occipital area. Antenna with scape and pedicel striated; clava with two sensoria reaching near the base; F1 is equal to pedicel; F3 longest (Figs. 25, 26).

Thorax (Fig. 29). Pronotum not visible in dorsal view of thorax; thorax and gaster equal in length; mesoscutum shorter than scutellum with transverse reticulations; notuli complete reaching towards margin, post scutellum laterally and posteriorly with elongated cells. Fore wing (Fig. 27) about 12.2x as long as broad with distal macrochaeta strong; two rows of setae on disc. Hind wing (Fig. 28) 30.6x as long as broad.

Gaster. Gaster equal to thorax. Ovipositor not exserted.

Relative measurements (slide): SL 25; SW 7; PL 15; PW 9; FnL 135; CLL 42; F1L 12; F2L 1; F3L 18; F4L 15;F5L 14; F6L 13;F7L 13; THL 80, MSTL 24; SCTL 33, SCTW 45; FWL 196; FWW 16; FFL 84; HWL 184; HWW 6; HFL 48; FTb 40; FBstr 15; MTb 60; MBstr 15; HTb 60; HBstr 20; PTL 18; GSTL 80; GSTW 65; OVPL 24.

Male. Unknown.

Hosts. Unknown.

Distribution. India: Assam. (China: Taiwan).

Material examined. 1♀ (On slide); INDIA: ASSAM: Kamrup, Boodapahar; 30.x.2008; coll. F.R.Khan (ZDAMU).

Comments. It is a first record of *Camptoptera sakaii* from India. The specimen was compared with the original description and figures.

4. *Camptoptera matcheta* Subba Rao

(Figures 30-35)

Camptoptera matcheta Subba Rao, 1989: 160-162, female, male. India, Karnataka, Mudigere.

Redescription

Female. Body dark brown to black. Antenna dark brown. Fore wing infuscate at base; hyaline in apical half. Hind wing hyaline. Legs light brown; coxae dark brown.

Head (Fig.30). Transverse reticulations on occipital area. Mandibles unidentate. Antenna shorter than body; pedicel longer F1 about 1.46x of F1 length (Fig. 31).

Thorax (Fig.33). Pronotum not visible in dorsal view of thorax; mesoscutellum short, less than half of the scutellum, with transverse reticulations; anterior scutellum with polygonal cells; lateral scutellum with longitudinal cells as in figure 33; propodeum with two vertical carinae. Fore wing (Fig. 32) with 2-3 rows of discal setae, about 12.6x as long as broad. Hind wing 20.4x as long as broad.

Petiole (Fig. 35) ridged.

Gaster (Fig. 35). Gaster shorter than thorax, about 0.90 of thorax length; (T1) long. Ovipositor hardly exserted.

Relative measurements (slide): HW 77; HL 52; EL 30; CPW 28; Min.FVW 46; TL 7; TMMD 20; SCL 38; SCW 10; PL 19; PW 10; FnL 78; CLL 42; F1L 13; F2L 1; F3L

14; F4L 11; F5L 12; F6L 11; F7L 11; THL 90; THW 70; MSTL 18; SCTL 57; SCTW 30; PDL 31; FWL 228; FWW 18; HWL 204; HWW 10; HFL 52; FTb 47; FBstr 16; MTb 61; MBstr 14; HTb 78; HBstr 20; GSTL 81; GSTW 77; EXS.OVL 2; OVL 51.

Male. Described by Subba Rao (1989).

Hosts. Unknown.

Distribution. India; Karnataka, Uttar Pradesh.

Material examined. 1♀ (on slide); INDIA: UTTAR PRADESH: Lakhimpur, Lakhkhi Purwa, Boodapahar; 26.ix.2006; coll. F.R.Khan (ZDAMU). 2 ♀ (on slides); KARNATAKA: Sringeri, Reserve forest; vi. 2002; from ATREE (Ashoka Trust for Research in Ecology and the Environment) det. by M. Hayat (ZDAMU).

Comments. The specimen recorded here were compared with their original description, figures and with the specimens present in ZDAMU.

5. *Camptoptera dravida* Subba Rao

(Figures 36-41)

Camptoptera dravida Subba Rao, 1989: 160-163, female. India, Karnataka, Mudigere.

Redescription

Female. Body dark brown except proximal half of gaster pale. Antenna light brown. Wings hyaline. Legs light brown.

Head (Fig. 36). Transverse striations on occipital area. Scape striated; pedicle longer than F1about 1.09x of F1 length; F3-F5 equal in length.

Thorax (Fig. 41). Pronotum not visible in dorsal view of thorax; mesoscutum equal to scutellum, about 0.55x of scutellum length; mesoscutum, scutellum and

propodeum with transverse striations. Fore wing (Fig. 40) with 1 row of discal setae, about 13.8x as long as broad. Hind wing about 29.3x as long as broad.

Gaster. Gaster shorter than thorax, about 0.96x of thorax length. Ovipositor short, not exserted at apex.

Relative measurements (slide): HW 55; HL 35; EL 27; CPW 11; Min.FVW 40; TL 5; TMMD 13; DBT 13; SCL 19; PL 12.5; PW 8; CLL 31; F1L 11; F2L 1; F3L 10; F4L 8; F5L 10; F6L 10; F7L 9; THL 65; MSTL 26; SCTL 26; FWL 138; FWW 10; FFL 58; HWL 132; HWW 4.5; HFL 42; MTb 43; MBstr 8; HTb 45; HBstr 8; HTrs 29; GSTL 63; OVL 36.

Male. Antenna 10-segmented (Fig. 38).

Hosts. Unknown.

Distribution. India: Karnataka, Tamil Nadu, Uttar Pradesh.

Material examined. 1♀ (on slide); INDIA: UTTAR PRADESH: Sharawasti, Chakra Bhandar; 3.x.2006; coll. F.R.Khan. 2♀, 2♂ (on slides); Aligarh, Shekha; 09.ix.2007; coll. F.R.Khan.

Comments. The specimens recorded here were compared with the original description and figures and found to be conspecific with *C. dravida.*

Key to Indian species of *Camptoptera*, females

1. Head with transversely reticulate sculpture (elongate cellulate-sculpture) 2

-. Head with transversely striate reticulate sculpture (lineolate reticulate-sculpture) 3

2. Mesoscutum with transversely reticulate sculpture; scutellum with polygonal cells, lateral sides with longitudinal cells; fore wing with 3-4 rows of discal setae ..... **1. *matcheta***

-. Mesoscutum with scale like reticulations; scutellum with reticulate sculpture; fore wing with one row of discal setae ..... **2. *assamensis*** sp. nov.

3. Mesoscutum with transversely striate reticulate sculpture 4

-. Mesoscutum with reticulate sculpture 6

4. Scutellum with elongated polygonal cells; scape long, well dilated; pedicel shorter than scape; all funicle segments, except the second, longer than broad .... **3. *brevifuniculata***

-. Scutellum with striate reticulate sculpture 5

5. Scutellum with striate reticulate sculpture (Fig. 41), fore wing with 5-7 setae in a row (Fig. 40) ..... **4. *dravida***

-. Scutellum with many longitudinal striate reticulate sculpture (Fig.17); fore wing with 15 setae in a row (Fig. 16) ..... **5. *hayati*** sp. nov.

6. Fore wing with discal setae arranged in two rows, an infuscate triangular patch near stigmal vein (Fig. 27) ..... **6. *sakaii***

-. Fore wing with discal setae arranged in a median line 7

7. Scutellum with elongate polygonal cells; scape narrower than pedicel; petiole smooth ..... **7. *kannada***

-. Scutellum with transversely reticulate sculpture; petiole lamellate 8

8. Antenna without curved scape; 1st funicle segment twice the length of pedicel ..... **8. *longifuniculata***

-. Antenna with curved scape; pedicel as long as the 1st funicle segment ... **9. *ambrae***

3. Genus- *Eubroncus* Yoshimoto, Kozlov & Trjapitzin

Eubroncus Yoshimoto, Kozlov & Trjapitzin, 1972: 879. Type species *Eubroncus orientalis* Yoshimoto, Kozlov & Trjapitzin, by original designation.

Stomarotrum Yoshimoto, Kozlov & Trjapitzin 1972: 881. Type species *Stomarotrum prodigiosum* Yoshimoto, Kozlov & Trjapitzin, by original designation; synonymized with *Eubroncus* by Triapitsyn & Huber (2000).

Diagnosis

Female. Head strongly angular (subtriangular) in lateral view; with acute angle between face and vertex, and a sub-rectangular projection between toruli. Mandibles not crossing medially, extremely long and narrow, with a strong apical tooth and row of denticles on ventral margin. Antenna 9- segmented, formula 1,1,6,1; with short funicle segments. Hind wing broad and bluntly rounded apically. Fore leg with inner margin of protibial spur distinctly comb-like. Tarsal formula 4-4-4.

Male. Flagellum 11- segmented.

Hosts. Unknown.

Species and Distribution. 3 species recorded from the Oriental, the Palaearctic and the Australian regions. One species from India.

1. ***Eubroncus indicus*** Hayat & Khan

(Figures 43-48)

Eubroncus indicus Hayat & Khan, 2009: 439-440, female. India, West Bengal, Darjeeling, Gorabari.

Redescription

Female (Fig. 43). Body completely dark brown. Head, thorax and petiole nearly black, highly metallic and shiny. Mandibles brownish-yellow. Antenna dark brown except radicle yellow. Wings infuscate, the infuscation prominent below venation. Legs dark brown, especially coxae; fourth tarsal segment of mid and hind legs, and tarsal segments 3 and 4 of fore legs brown; remaining tarsal segments pale brownish yellow.

Head (Fig. 44). In dorsal view 1.2x as long as wide; eyes oval; broadest anteroventrally and narrower posterodorsally; 1.4x as long as broad (7: 5); ocellar triangle with apical angle strongly obtuse. Mandibles slightly longer than length of vertex (14: 13.5) and shorter than dorsal length of head (14: 18) (Fig. 44). Antenna as in figure 45; scape about 5.5x as long as broad.

Thorax. Only slightly longer than length of petiole and gaster combined (32.5: 29.5) and slightly more than 2x as long as broad (32.5: 15); pronotum slightly longer than mesoscutum (9: 8); median length of propodeum 0.8x of mesoscutum length (6.5: 8) and 0.76x length of scutellum (anterior and posterior scutellum combined) (6.5: 8.5); apex of propodeum with a small tooth at posterolateral margin on each side; propodeum in mesal third with a nearly 'U'- shaped ridge. Wings as in figures 46 and 48; basal setation as in figure 47.

Petiole 1.62x as long as broad, with short spine like projection from each side anterolaterally.

Gaster. Shorter than thorax (23: 32.5); TI (first tergite) smooth, without any ridges or carinae; T I occupying 0.45x gaster length: T II occupying 0.32x of gaster length, remaining tergites very narrow and partly retracted; ovipositor short, not exserted at apex.

Relative measurements (slide). HL 18; EL 7; EW 5; MDL 4; LVR 13.5; THL 32.5; THW 15; PNL 9; PNW 14; MSTL 8; SCTL 8.5; PDL 6.5; PEL 29.5; GSTL 23.

Male. Unknown.

Hosts. Unknown.

Distribution. India: West Bengal.

Material examined. Holotype ♀ (on card, with right wings and antenna on slide); INDIA: WEST BENGAL: Darjeeling, Gorabari; 15.vi.2008; coll. F.R. Khan (ZDAMU, Reg. No. HYM/ CH. 568).

Comments. As noted by Hayat & F. R. Khan (2009), this species differ from *E. prodigiosus* (Yoshimoto *et al.*, 1972) by the following characters: *Eubroncus indicus* has oval shaped eyes, the scape about 5.5x as long as broad, the petiole 1.62x as long as broad, and TI of gaster nearly smooth. (In *E. prodigiosus*: based on the description given by Triapitsyn & Berezovskiy 2002b: the eyes are circular; the scape about 3x as long as broad; the petiole about as long as broad, and T I of gaster with prominent ridges and carinae).

4. Genus *Himopolynema* Taguchi

Himopolynema Taguchi, 1977a: 137. Type species *Himopolynema hishimonus* Taguchi, by original designation.

Himopolynema Taguchi: Hayat & Anis, 1999a: 16, 18. Triapitsyn & Huber, 2000: 614. Triapitsyn & Berezovskiy, 2002a: 3, 6. Hayat *et al.*, 2003: 1, 5.

Diagnosis

Female. Antenna 9-segmented, formula 1,1,6,1; face with a pit next to each torulus. Pronotum and mesothoracic tergites with blunt or indented tipped setae; propodeum with a median groove of variable width. Fore wing long and narrow with long marginal fringe. Tarsal formula 4-4-4. Petiole attached to tergum of gaster.

Male. Similar to female, except for the genitalia and antennae. Antenna 13-segmented, with flagellum filiform, not differentiated into funicle and clava.

Hosts. Recorded from Cicadellidae.

Species and Distribution. 9 species recorded from the Palearctic, the Australian and the Oriental regions. 5 species from India.

1. *Himopolynema hishimonus* Taguchi

(Figures 49-54)

Himopolynema hishimonus Taguchi, 1977a: 137, female, male. Japan, Ayabe, Kyoto Pref.

Himopolynema hishimonus Taguchi: Hayat & Anis, 1999a: 16, 18. Triapitsyn & Huber, 2000: 614. Triapitsyn & Berezovrskiy, 2002a: 3, 6. Hayat *et al.*, 2003: 1, 5. Hayat *et al.*, 2008: 328.

Redescription

Female. Body dark brown to black except petiole which is honey yellow. Antenna honey yellow with clava dark brown head completely dark brown. Wings hyaline. Legs honey yellow; femora and tibiae brown to dark brown; tarsal segments 1-3 yellow, 4th dark brown.

Head (Fig. 49). In frontal view 1.2x as long as wide. Mandibles tridentate. Antenna (Fig. 50) with pedicel longer than F1 length.

Thorax (Fig. 53). Slightly longer than gaster; pronotum with 4+4 setae; each axilla indistinctly divided from scutellum and with a long seta; canal of propodeum narrow. Fore wing broad apically, about 4.8x as long as broad, venation and discal setation as in figure 52. Hind wing 29x as long as broad. Fore tibiae with a row of seven tooth-like spines on the inner lateral surface.

Gaster (Fig. 54). Shorter than thorax, about 0.96X of thorax length; exserted ovipositor length 0.3X of gaster length.

Relative measurements (slide): HW 82; HL 73; EL 40; CPW 20; Min. FVW 49; TL 8; TMMD 27; SCL30; SCW 22; PL 21; PW 11; CLL 49; F1L 10; F2L 12; F3L 9; F4L 9; F5L 10; F6L 11; THL 99; MSTL 34; MSTW 58; SCTL 43; SCTW 38; FWL 252; FWW 52; FFL 58; HWL 232; HWW 8; HFL 32; MTb 72; MBstr 33; GSTL 96; GSTW 60; OVPL 92; EXS.OVL 30.

Male. Differs from the female in the antennal structure and genitalia. Antenna as in figure 50.

Host. In Japan reared from eggs of *Hishimonus sellatus* (Uhler) (Deltocephalidae). Unknown from India.

Distribution. India: Andhra Pradesh, Assam, Uttar Pradesh, Jharkhand, West Bengal. (China: Taiwan).

Material examined. 1♀, 1♂ (on slides); INDIA: WEST BENGAL: Cooch Behar, Mati Khata; 25.v.2008; coll. F. R. Khan. 2♀ (on slides); New Jalpaiguri, Chatt Purdanpura; 30.v.2008; coll. F. R. Khan. 1♀ (on slide); Islampur, Gudish Basti; 07.vi.2008; coll. F.R. Khan. 1♀ (on slide); New Alipurduar, Marich Bari; 20.v.2008; coll. F.R. Khan. 1♂ (on slide); UTTAR PRADESH: Gonda, Poterganj; 07.x.2006; coll. F.R. Khan.

Comments. The author has also examined the specimens recorded by Hayat & Anis (1999a) and Hayat *et al.*, (2003, 2008). The specimens recorded here were compared with the specimens present in ZDAMU.

Himopolynema hishimonus differs from the other Indian species by the characters given in the key.

2. *Himopolynema haflongum* Hayat & Singh

(Figures 55-59)

Himopolynema haflongum Hayat & Singh, 2003: 2-5, female. India, Assam, Haflong.

Redescription

Female (Fig. 59). Body dark brown to nearly black with violet luster (noted from card mounted specimen); head completely black. Antenna brown except clava dark brown. Petiole yellow. Wings hyaline. Legs brown except distal part of femur and tibia dark brown; tarsal segments 1-3 yellow, 4th dark brown.

Head (Fig. 55). Mandibles light brown, tridentate. Scape smooth; F2 longest (Fig.56).

Thorax (Fig. 58). Longer than gaster (126:100); propodeum with transparent setae. Fore wing (Fig. 57) 3.2x as long as broad.

Gaster (Fig. 59). Shorter than thorax, about 0.79x of thorax length; Exserted ovipositor length 0.07x of gaster length.

Relative measurements (slide): HW 93; HL 55; EL 36; Min.FVW 58; TL 10; TMMD 23; DBT 34; SCL 28; SCW 12; PL 22; PW 12; CLL 60; CLW 24; F1L 15; F2L 24; F3L 16; F4L 14; F5L 10; F6L 11; THL 126; MSTL 45; SCTL 48; PDL 15; FWL 250; FWW 76; FFL 46; HWL 230; HWW 14; HFL 39; FTb 55; FBstr 32; MTb 75; MBstr 32; HTb 80; HBstr 30; PTL 30; GSTL 100; GSTW 74; EXS.OVL 7.5; OVL 81.

Male. Unknown.

Hosts. Unknown.

Distribution. India: Assam, West Bengal.

Material examined. 1♀ (on slide); INDIA: WEST BENGAL: Islampur, Sibdargi Para; 10.vi. 2008; coll. F. R. Khan.

Comments. The holotype of *H. haflongum* is in the NPCI and could not be examined. Therefore, the above specimen is compared with the original description and figures and found to be conspecific with *H. haflongum.*

3. *Himopolynema longiclavatum* Hayat & Anis

(Figures 60-65)

Himopolynema longiclavatum Hayat & Anis, 1999a: 18-20, female. India, Kerala, Calicut Univ. Campus.

Redescription

Female. Body black except petiole yellow. Head black as body. Clava dark brown and shiny; scape yellow brown; funicle brown. Wings hyaline and broad apically. Legs dark brown proximal half of fore, mid and hind tibiae yellow brown; tarsal segments 1-3 whitish, 4th dark brown. Gaster black and shiny.

Head (Fig. 60). Scape striated; F1 shortest; clava elongated and longer than broad.

Thorax (Fig. 64). Shorter than gaster about 0.65x of gaster length; mesoscutum almost equal to scutellum about 0.93x; pronotum clearly visible in dorsal view of thorax. Fore wing (Fig. 62) about 5.5x as long as broad. Hind wing 28.6x as long as broad.

Gaster (Fig. 65). Longer than thorax, about 1.52x of thorax length. Exserted ovipositor length 0.07x of gaster length.

Relative measurements (slide): HW 86; EL 41; CPW 35; Min.FVW 55; MSL 27; TL 9; MDL 12; TMMD 18; SCL 95; PL 22; FnL 90; CLL 68; CLW 15; F1L 8; F2L 17; F3L 17; F4L 15; F4W 5; F5L 15; F5W 6; F6L 15; F6W 7; THL 115; THW 70; MSTL 44; SCTL 47; FWL 275; FWW 50; FFL 52; HWL 258; HWW 9; HFL 36; FTb 57; FBstr 32; MTb 78; MBstr 45; HTb 98; HBstr 43; PEL 34; GSTL 175; EXS.OVL 13; OVL 140.

Male. Unknown.

Hosts. Unknown.

Distribution. India: Kerala, Karnataka, West Bengal.

Material examined. 1♀ (on slide); INDIA: WEST BENGAL: New Jalpaiguri, Chatt Purdanpura; 30.v.2008; coll. F.R.Khan.

Comments. The holotype of *H. longiclavatum* is in the BMNH and could not be examined. Therefore the above specimen is compared with original description and figures, and found to be conspecific with *H. longiclavatum*.

Key to Indian Species of *Himopolynema*, females

(After Hayat, Basha & Singh, 2003)

1. Head with subantennal grooves absent; facial pits located in line with or below level of antennal toruli; propodeum with lateral longitudinal ridges behind each spiracle absent; fore wing broad, clearly less than 4x as long as broad, with marginal fringe about O.5x of wing width; F2 at least as long as pedicel 2

-. Head with subantennal grooves present; facial pits located in line with or above level of antennal toruli; propodeum with lateral longitudinal ridges behind each spiracle present; fore wing at least 4x as long as broad, with marginal fringe at least O.75x of wing width; F2 shorter than pedicel 3

2. Propodeum with 3 setae on each side of medial groove; legs with coxae, femora and tibiae, except ends, dark brown. [India: Assam] .... **1. *hexatricha*** Hayat & Basha

-. Propodeum with a single seta on each side; legs, including coxae, largely infuscate yellow-brown. [India: Assam] ..... **2. *haflongum*** Hayat & Singh

3. Antennal toruli placed lower on face, separated from transverse trabecula by about twice their own diameters 4

-. Antennal toruli placed higher on face, almost touching transverse trabecula. [F1 2x as long as broad and shorter than F2; distal funicle segments not cylindrical.

narrow basally asymmetrically broadened apically]. [India: Assam]..... ..... **3. *indicum*** Hayat & Basha

4. F1 distinctly shorter (about 0.6x) than F2; F2-6 longer than broad, F2 about 2.5x, and F6 about 1.5x, as long as broad; distal funicle segments cylindrical; ovipositor long, anteriorly protruded and 2.5x as long as mid tibia. [India: Kamataka, Kerala] ..... **4. *longiclavatum*** Hayat & Anis

-. F1 slightly shorter than F2; F2 less than 2x as long as broad, and F6 nearly quadrate; distal funicle segments not cylindrical, basally narrowed and broadened apically; ovipositor not protruded anteriorly, about 1.5x as long as mid tibia. [Japan, India: Andhra Pradesh, Assam, Jharkhand, W. Bengal] .... **5. *hishimonus*** Taguchi

5. Genus *Litus* Haliday

Litus Haliday, 1833: 269, 345. Type species *Litus cynipseus* Haliday 1833, by designation of Gahan & Fagan, 1923: 81.

Neolitus Ogloblin, 1935: 60. Type species *Neolitus argentinus* Ogloblin, 1935, by original designation. Synonymy by Triapitsyn & Berezovskiy (2004).

Diagnosis

Female. Body robust, highly sclerotized; head and thorax strongly sculptured. Mandible unidentate or bidentate, sometimes longer than malar space. Antennal formula, 1,1,6,1; funicle segments without longitudinal sensilla; clava unsegmented, usually with 4 longitudinal sensilla. Mesoscutum usually with distinct notauli; scutellum with distinct anterior and posterior parts, the latter longer than the former; mesophragma projecting into gaster and usually with apex rounded. Fore and hind wings long and narrow, with very long marginal fringe; marginal vein of fore wing long. Legs with coxae usually strongly reticulate; tarsal formula 5-5-5. Gaster with first tergite long. Ovipositor length variable, either short or long, and hidden or slightly to strongly exserted at apex.

Petiole broader than long.

Male . Unknown.

Hosts. Gregarious egg parasitoids of large Staphylinidae (Coleoptera) (Triapitsyn & Berezovskiy 2004).

Species and Distribution. The genus *Litus* contains 14 species including extinct species. It is nearly cosmopolitan, known from all the zoogeographical regions, except Australia and New Zealand. The Oriental Region species we know till now are from Thailand (*L. sutil* Triapitsyn & Berezovskiy), Taiwan (China) (*L. camptopterus*

Novicky), and Nepal (*L. usach* Triapitsyn & Berezovskiy). India, 2 species (*L. huberi* and *L. triapitsyni*).

The species *L. enocki* Howard (1896) from Sri Lanka has been transferred to *Camptoptera* by Triapitsyn & Berezovskiy (2004).

1. ***Litus huberi*** Rehmat & Anis

(Figures 66-72)

Litus huberi Rehmat & Anis, 2009: 370-374, female. India, Assam, Guwahati, Kontola.

Redescription

Female. Body except distal three tergites of gaster which are brownish-yellow, dark brown to black, shiny; ovipositor sheaths dark brown. Mandibles pale yellow. Antennae dark brown. Fore wing lightly infuscate, hyaline in apical third. Hind wing sub-hyaline. Legs with coxae black; femora and tibiae brown to dark brown; tarsi brownish.

Head (Fig. 66). Frontovertex broad, about two-thirds of head width (34:53.5); frons with a slightly curved line of prominent denticles (Fig. 67); clypeus with a median apically pointed lobe (Fig.68); antennal toruli removed from transverse trabecula by a distance slightly greater than diameter of a torulus; ocellar triangle with apical angle strongly obtuse; posterior ocelli nearly touching supraorbital trabecula; frons with several minute tubercles. Vertex with wide-meshed reticulations; temples strongly reticulate. Mandible unidentate, long, longer than malar space (Figs. 66, 68) mandibles appear shorter as the figure was drawn in dorso-lateral view). Antenna as in figure 69; scape, in lateral view as in *triapitsyni*, Rehmat & Hayat, but appears

basally straight as it is oriented ventrally; first, fifth and sixth funicle segments (F1, F5, F6) quadratic, F2-4 slightly longer than broad, F2 longest; clava un-segmented, about 2.3x as long as broad, slightly shorter than preceding 5 funicle segments combined, and with 4 longitudinal sensilla.

Thorax (Fig.71). Compact, strongly sclerotized (characteristic of the genus); pronotum not visible in dorsal view of thorax, strongly reticulate, the cells laterally elongate and medially convergent; mesoscutum short, not more than half the length of scutellum, with raised reticulate sculpture, and with 2+2 setae, mesoscutum without notaular lines; posterior scutellum with prominent raised reticulate sculpture (Fig.71) compared to sculpture on anterior scutellum; propodeum posterior half behind transverse ridge narrowed and with prominent longitudinal ridges (Fig.71). Fore wing disc (=blade) narrow, apically pointed (Fig.70); and about 17.5x as long as broad (width measured at broadest point), if width of the blade is measured, the fore wing nearly 22x as long as broad; disc almost bare, except for 2-3 setae just distal of venation, and a row of 5 setae along posterior margin in middle of disc; venation characteristic of *Litus* species. Hind wing 24.5x as long as broad, similar to that in *triapitsyni* Rehmat & Hayat, disc with a line of setae. Legs with coxae strongly sclerotized.

Gaster (Fig.72). Gaster longer than thorax (79:63); first tergite (TI) long, occupying nearly three-fourths of gaster length; other tergites appear strongly transverse (retracted within gaster); last tergite (TVII) apically conical; ovipositor short, and in slide mounted holotype, exserted to 0.17x of gaster length.

Relative measurements (slide). HW 53.5; CLL 39.5; CLW 17; MIN.FVW 34; THL 63; MTb 45;HTb 56; MTrs 35; HTrs 55; GSTL 79; OVPL 73.

Male. Unknown.

Hosts. Unknown.

Material examined. Holotype ♀ (on slide under 3 coverslips); INDIA: ASSAM: Guwahati, Kontola; 28.x.2008; coll. F.R. Khan. (NPCI, Reg. No. 13/6/70/3). Paratype ♀ (on slide under 3 coverslips); INDIA: ASSAM: Guwahati, Borkusi; 28.x.2008; coll. F.R. Khan. (ZDAMU, Reg.No. HYM/CH. 577).

Distribution. India: Assam.

Comments. As noted by Rehmat & Anis (2009), this species differ from *Litus triapitsyni* Rehmat & Hayat, 2009 by the following characters: *Litus huberi* has anterior margin of frons slightly convex, with a row of large denticles; ovipositor originates from basal fourth of gaster and very slightly exserted, the exserted part about 0.17x of gaster length; ovipositor 1.65x as long as mid tibia and 1.30x as long as hind tibia.

2. *Litus triapitsyni* Rehmat & Hayat

(Figure 73-77)

Litus triapitsyni Rehmat & Hayat, 2009: 370-374, female. India, Assam, Guwahati, Koylajol.

Redescription

Female. This species is very similar to *L. huberi* Rehmat & Anis, sp. nov. in body colour, various dimension of body parts, and sculpture, but differs only in the following characters: Anterior margin of frons biconvex with a row of large denticles; funicle segments (Fig. 74) all longer than broad, F1 about 1.5x, F2 and F3 2x, F4 1.75x, and F5 and F6 each a little longer than broad; clava 2.3x as long as broad;

ovipositor originates from near base of gaster, and strongly exserted at apex, the exserted part 0.39x of gaster length (Fig.77).

Relative measurements (slide). CLL 40; CLW 7; THL 57; MTb 48; MTrs 40; HTb 64; HTrs 60; FWL 184; FWW 18; FFL 70; HWL 180; HWW 6; HFL 70; GSTL 74; OVPL 95.

Male. Unknown.

Hosts. Unknown.

Distribution. India: Assam.

Material examined. Holotype ♀ (on slide under 3 coverslips); INDIA: ASSAM: Guwahati, Koylajol; 29.x.2008; coll. F.R. Khan. (NPCI, Reg. No. 13/6/70/4).

Comments. This species is very close to *L. huberi* Rehmat & Anis, but differs in having the anterior margin of frons with two convex lobes provided with large denticles; ovipositor originates from near base of gaster, and strongly exserted at apex, exserted part 0.39x of gaster length; ovipositor 1.98x as long as mid tibia and 1.48x as long as hind tibia. [In *huberi*: anterior margin of frons slightly convex, with a row of large denticles; ovipositor originates from basal fourth of gaster and very slightly exserted, the exserted part about 0.17x of gaster length; ovipositor 1.65x as long as mid tibia and 1.30x as long as hind tibia].

6. Genus *Pseudanaphes* Noyes & Valentine

Pseudanaphes Noyes & Valentine, 1989; 47. Type species *Pseudanaphes hirtus* Noyes & Valentine, by original designation.

Diagnosis

Female. Body nearly smooth, without sculpture. Frontovertex about half of head width and 2x as broad as an eye; antennal toruli separated from transverse trabeculae at most by their own diameter. Antennal radicle distinct; antennal formula, 1,1,6,3; clava 3-segmented, the suture transverse. Mandible with 3 sharp teeth. Pronotum in the Indian species, medially membranous; notaulices distinct; scutellum consisting of an anterior and posterior part, the outer part bearing circular pits; propodeum long, at least about half the length of scutellum; propodeum with a pair of long setae. Fore wing moderately broad, with disc densely setose; venation not reaching to half length of wing, marginal and stigmal veins long. Tarsal formula 4-4-4. Gaster with lengths of tergites variable. Ovipositor at most as long as gaster; hypopygium not reaching to apex of gaster.

Male. Illustrated key by Lin *et al.* (2007) from a indetermined specimen. Almost similar to female except for the antennae and genitalia. Antenna 13-segmented with a 2-segmented clava.

Hosts. Unknown.

Species and Distribution. The genus *Pseudanaphes* contains 5 species including the one described here. It is known from Australia, China and New Zealand. The type species, *P. hirtus* Noyes & Valentine (1989), was based upon specimens collected in New Zealand; *P. zhaoi* Lin (1997), from China and two Australian species described

in the genus *Polynemoidea* Girault but recently transferred to *Pseudanaphes* by Lin *et al.*, (2007).

1. *Pseudanaphes sikkimianus* sp. nov.

(Figures 78-84)

Description

Female (Holotype). Body dark brown except anterior scutellum which is brownish-yellow. Mandibles brownish yellow. Antenna with radicle, scape, pedicel and funicle brownish-yellow, dorsal margins of scape and pedicel brown; clava dark brown. Fore wing hyaline with a characteristic curved infuscate band behind proximal half of marginal vein, and infuscate behind submarginal vein (Fig. 80). Hind wing with pale infuscation; veins dark brown (Fig.81). Legs brownish-yellow; fore tibia and tarsal segments 1-4 of mid and hind legs and 1-3 of fore leg yellow; tarsal segments 4 of fore leg pale brown.

Head (Fig.78). Vertex with 6+6 long, brown setae; frons and face below transverse trabecula with 12+12 long, brown setae; antennal toruli very close to transverse trabeculae; eyes sparsely setose, setae transparent and each seta about as long as diameter of a facet; ocellar triangle with apical angle strongly obtuse; posterior ocellus very close to eye margin. Mandible (Fig.78) sharply three-dentate. Antenna (Fig.79); funicle segment 6 (F6) with one longitudinal sensillum; second segment of clava with 2 sensilla and third segment of clava with 3 sensilla.

Thorax (Fig. 82). Completely smooth; pronotum in middle fifth membranous, and lateral plate with 3 long and 2 short setae along collar; mid lobe of mesoscutum with 1+1 setae, each side lobe with one and each axilla with one seta; propodeum with a

pair of setae in about mesal fourth; both anterior and posterior scutella without setae; propodeum medial length 0.62x of scutellum length (31:50); spiracles circular, very small and removed from anterior margin of propodeum by about their own diameters. Fore wing (Fig. 80) 3.33x as long as broad (103.5:31), with marginal fringe 0.48x of wing width; venation reaching to 0.4x of wing length. Hind wing (Fig. 81) 15.4x as long as broad (77:5), with marginal fringe 2.4x as long as wing width; disc beyond venation with about 5 lines of setae, one along anterior margin, two lines along posterior margin and two lines in middle of disc. Legs normal; fore tibia with 8 peg-like setae apart from normal setae; fore tibial spur and tarsus as in figure

Gaster (Fig. 84). About as long as thorax; ovipositor (= second valvifer and third valvula combined) as seen through the dorsum, originates from about level of tergite second (TII) of gaster, and not exserted at apex; ovipositor length (34) equal to length of hind tibia (34), and longer than mid tibia (34:29).

Relative measurements (slide). EL 12; EW 6; TMMD 7; DBT 8; SL 41; SW 16; PL 25; PW 13; CLL 81; CLW 20.5; F1L 14.5; F1W 7; F2L 17; F2W 7; F3L 16; F3W 7; F4L 14.5; F4W 8.5; F5L 14.5; F5W 8.75; F6L 16.5; F6W 11; THL 25; THW 24; PDL 31; SCTL 15; FWL 103; FWW 5.31; HWL 70; HWW 5; HFL 13.5; FTb20; MTb 29; HTb 34; FTrs 20.5; MTrs 20; HTrs 21; OVPL 34.

Male. Unknown.

Hosts. Unknown.

Material examined. Holotype ♀ (on slide under 3 coverslips); INDIA: SIKKIM: Gangtok, Hanumantok; 15.x.2008; coll. F.R.Khan (ZDAMU).

Comments. *Pseudanaphes sikkimianus*, sp. nov. appears closely related to *P. zhaoi* Lin (1997), but differs as follows: posterior ocelli small, each placed very close to eye

margin; funicle segment 5 (F5) subequal in length to F4; clava as long as F2-6 combined; longitudinal sensilla on F4 absent; anterior scutellum without setae; fore wing 3.33x as long as broad with marginal fringe 0.48x of wing width; hind wing 15.4x as long as broad, marginal fringe 2.4x as long as wing width (In *P. zhaoi*: posterior ocelli relatively large, and each removed from eye margin by its own diameter, F5 distinctly shorter than F4 (18:23); clava slightly longer than F3-6 combined; F4 with one longitudinal sensillum; anterior scutellum with one pair of setae; fore wing about 2.85x as long as broad, with marginal fringe about one-third of wing width; hind wing 12x as long as broad with marginal fringe 1.7x as long as wing width. Based on the description and figures given by Lin, 1997).

7. Genus *Stethynium* Enock

Stethynium Enock, 1909: 452. Type species *Stethynium tricalvatum* Enock, 1909 by monotypy.

Stethynium Enock: Annecke & Doutt, 1961: 8; Schauff, 1984: 48; Huber, 1987: 828; Noyes & Valentine, 1989: 53; Yoshimoto, 1990: 44; Triapitsyn & Huber, 2000: 614.

Diagnosis

Female. Antenna 11-segmented, formula 1,1,6,3; clava 3-segmented, compact with oblique sutures. Posterior scutellum about twice as long as width of each lobe; mesophragma broadly rounded apically. Forewing with a distinct, rounded basal lobe behind venation, narrow beyond venation and widening evenly towards rounded to slightly pointed apex; stigmal vein, and marginal vein at level of distal macrochaeta distinctly thicker than at level of hypochaeta. Tarsal formula, 4-4-4.

Male. Similar to female, except from the genitalia and antennae. Antenna 11-segmented.

Hosts. Cicadellidae; gall-forming Eulophidae.

Species and Distribution. 53 species recorded from Nearctic, Neotropical, Palaearctic, Australian, and Oriental regions. 1 species from India.

1. ***Stethynium empoascae*** Subba Rao

(Figures 85-91)

Stethynium empoascae Subba Rao, 1966: 189, 191, female. Delhi, India.

Stethynium empoascae Subba Rao: Huber, 1987: 829 (As synonymy of *S. triclavatum* Enock); Triapitsyn, 2002: 10, as a valid species

Stethynium triclavatum Enock: Hayat, 1992: 83- 89. Misidentification.

Diagnosis

Female (Fig. 91). Body yellow. Head brown; mandibles dark brown. Antenna brown except clava dark brown. Fore wing hyaline at apex and slightly infuscate at the basal part. Hind wing slightly infuscate. Ovipositor exserted.

Head (Fig.85). Mandibles tridentate. Scape striated; F1 0.84x shorter than pedicel length; F5 shortest.

Thorax (Fig. 90). Shorter than gaster about 0.57x of gaster length. Pronotum is visible in dorsal view of thorax; mesoscutum is shorter than scutellum almost more than half of the length of scutellum. Fore wing (Fig.88) about 4.77x as long as broad. Hind wing (Fig.89) about 15x as long as broad.

Gaster. 1.73x longer than thorax length; ovipositor exserted.

Relative measurements (slide): HW 60; HL 52; EL 35; DBT 20; MDL 13; TL 5; SCL 23.5; SCW 10; PL 13; PW 10; CLL 39; F1L 11; F2L 12.5; F3L 10; F4L 10; F5L 9.5; F6L 12; THL 80; MSTL 30; SCTL 50; FWL 210; FWW 44; FFL 52; HWL 180; HWW 12; HFL 148; FTb 45; FBstr 18; MTb 73; MBstr 15; HTb 66; HBstr 10; GSTL 150; OVPL 110; EXS.OVL 20.

Male. Similar to female except in antennal structure and genitalia. Antenna (Fig. 87) with a 11-segmented flagellum.

Host. *Amrasca devastans* (Distant).

Distribution. India: Delhi, Karnataka, Punjab, Uttar Pradesh. (Australia).

Material examined. 1♀ (on slide); INDIA: UTTAR PRADESH: Nagla Dawoodpur; 6.iv.2007; coll. F.R. Khan. 2♀ (on slides); Uttar Pradesh: Aligarh; Nov.1980 and 3.xi.1982; coll. M. Hayat. det *Stethynium triclavatum* by Hayat, 1991. 1♀, 1♂ (on slide); Tundla, Sikrari; 01.ix.2007; coll. F.R. Khan. 1♀ (on slide); PUNJAB: Pthankot, Sujanpur; 10.vii.2006; coll. S.M.A. Badruddin & F.R. Khan.

Comments. The specimens recorded here was compared with the specimens present in ZDAMU and with their original description and figures.

References

Annandale, N. 1909. Description of minute hymenopterous insect from Calcutta. *Records of the Indian Museum*, 3: 299-300, pl. xxiii.

Annecke, D. P. & Doutt, R. L. 1961. The genera of the Mymaridae. Hymenoptera: Chalcidoidea. *Entomological Memoirs*, Department of Agricultural Technical Services, Republic of South Africa, 5: 1-71.

Ashmead, W. H. 1904. Classification of the chalcid flies or the superfamily Chalcidoidea, with descriptions of new species in the Carnegie Museum, collected in South America by Hubert H. Smith. *Memoirs of the Carnegie Museum*, 1: 225-551.

DeBach, P. & Rosen, D., 1991. *Biological Control by Natural Enemies*. Cambridge University Press, Cambridge.

Debauche, H. R. 1948. Étude sur les Mymarommidae et les Mymaridae de la Belgique (Hym., Chalcidoidea). *Mémoires du Musée Royal d'Histoire Naturelle de Belgique*, 108: 248pp.

Debauche, H.R. 1949. Mymaridae (Hymenoptera, Chalcidoidea). *Exploration du Parc National Albert, Mission G.F. de Witte*, 49: 1-105.

Enock, F. 1909. New genera of British Mymaridae (Haliday). *Transactions of the Entomological Society of London*, 1909: 449-459.

Foerster, A. 1856. *Hymenopterologische Studien. II Heft. Chalcidiae und Proctotrupii.* Aachen, 152pp.

Gahan, A.B. & Fagan, M.M. 1923. The type species of the genera of Chalcidoidea or chalcid-flies. *Bulletin of the United States National Museum, Washington*, 124:173pp.

Ghesquière, J. 1942. Contribution à l'étude des Hyménoptères du Congo Belge. IX. Remarques sur la famille des mymarides de description d'espèces nouvelles. *Revue de Zoologie et de Botanique Africaines*, 36: 317-328.

Girault, A.A. 1913. A synonymic note on the Mymaridae. *Proceedings of the Entomological Society of Washington*, 14: p. 221.

Girault, A.A. 1917. *Descriptions hymenopterorum chalcidoidicarum variorum cum observationibus.* V. Glenndale. 16pp. (Privately published).

Girault, A.A. 1929. *North American Hymenoptera Mymaridae.* Brisbane. 27pp. (Privately published).

Haliday, A.H. 1833. An essay on the classification of the parasitic Hymenoptera of Britain, which correspond with the *Ichneumones minuti* of Linnaeus. *Entomological Magazine*, 1: 259-276, 333-350, 490-491.

Hayat, M. 1992. Records of some Mymaridae from India, with notes (Hymenoptera: Chalcidoidea). *Hexapoda*, 4: 83-89.

Hayat, M. & Anis, S.B. 1999a. New record of two genera *Ptilomymar* and *Himopolynema* from India, with descriptions of two new species (Hymenoptera: Mymaridae). *Shashpa*, 6: 15-22.

Hayat, M. & Anis, S.B. 1999b. The Indian species of *Acmopolynema* with notes on *Acanthomymar* (Hymenoptera: Chalcidoidea: Mymaridae). *Oriental Insects*, 33: 297-313.

Hayat, M. & Anis, S.B. 1999c. The Indian species of *Polynema* with notes on *Stephanodes reduvioli* (Hymenoptera: Mymaridae). *Oriental Insects*, 33: 315-331.

Hayat, M., Anis, S.B. & Khan, F.R. 2008. Descriptions of two new species of Mymaridae (Hymenoptera: Chalcidoidea) from India, with some records. *Oriental Insects*, 42: 327-333.

Hayat, M., Basha, M.C. & Singh, S. 2003. Descriptions of three new species of *Himopolynema* from India (Hymenoptera: Chalcidoidea: Mymaridae). *Shashpa*, 10: 1-6.

Hayat, M. & Khan, F.R. 2009. First record of *Eubroncus* from India (Hymenoptera: Chalcidoidea: Mymaridae), with description of a new species. *Journal of Threatened Taxa*, 1 (8): 439-440. (Online Journal).

Hayat, M. & Singh, S. 2001. Description of a new species of *Polynema* from India with further records of *Himopolynema hishomonus* (Hymenoptera: Chalcidoidea: Mymaridae). *Shashpa*, 8 (2): 95-97.

Howard, L.O. & Ashmead, W.H. 1896. On some reared parasitic hymenopterous insects from Ceylon. *Proceedings of the United States National Museum*, 18: 633-648.

Huber, J.T. 1986. Systematics, biology, and hosts of the Mymaridae and Mymarommatidae (Insecta: Hymenoptera): 1758-1984. *Entomography: An Annual Review for Biosystematics*, 4: 185-243.

Huber, J.T. 1987. Review of *Schizophragma* Ogloblin and the non-Australian species of *Stethynium* Enock (Hymenoptera: Mymaridae). *The Canadian Entomologist*, 119: 823-855.

Huber, J. T. 1997. Chapter 14. Mymaridae. In: Gibson G. A. P., Huber J. T., Woolley J. B. (Eds.). Annotated keys to the genera of Nearctic Chalcidoidea (Hymenoptera). *Ottawa, NRC Research Press*: 499-530.

Huber, J.T. 2002. Review of *Chaetomymar* Ogloblin with description of a new species in the Hawaiian Islands (Hymenoptera: Mymaridae). *Journal of Hymenoptera Research*, 12(1): 77-101.

Huber, J.T. & Fidalgo, P. 1998. Review of the genus *Stephanodes* (Hymenoptera: Mymaridae). *Proceedings of the Entomological Society of Ontario*, 128: 27-63.

Huber, J.T & Lin Nai-quan. 1999. World review of the *Camptoptera* group of genera (Hymenoptera: Mymaridae). *Proceedings of the Entomological Society of Ontario*, 130: 21-65.

Kieffer, J. J. 1913. Description d'un nouveau Mymaride des Indes Orientales. *Records of the Indian Museum*, 9: 201-202.

Lin, N.Q. 1997. A new species of *Pseudanaphes* (Hym. Mymaridae) from China. *Wuyi Science Journal*, 13: 98-100.

Lin, N.Q., Huber, J.T. & LaSalle, J. 2007. The Australian genera of Mymaridae (Hymenoptera: Chalcidoidea). *Zootaxa*, 1596: 1-111.

Malenotti, E. 1917. *Metalaptus torquatus* n. gen. e n. specie di calcidite. *Redia*, 12: 339-341, Plate V.

Mani, M.S. 1938. Catalogue of Indian Insects. Part 23. Chalcidoidea. 1-174. Government of India.

Mani, M.S. 1942. Studies on Indian parasitic Hymenoptera II. *Indian Journal of Entomology*, 4: 153-162.

Mani, M.S. 1989. The fauna of India and adjacent countries, Chalcidoidea (Hymenoptera. Part II.). 1069-1633. Zoological Survey of India, Calcutta.

Mani, M. S. & Saraswat, G. G. 1973. Part III. Family Mymaridae. In: Mani M. S., Dubey O. P., Kaul B. K. & Saraswat, G. G. On some chalcids (Hymenoptera) from India. *Memoirs of the School of Entomology*, 2: 101-125.

Matheson, R. & Crosby, C.R. 1912. Aquatic Hymenoptera in America. *Annals of the Entomological Society of America*, 5: 65-71.

Mathot, G. 1966. Contribution à la connaissance des Mymaridae et Mymarommatidae d'Afrique central (Hymenoptera:Chalcidoidea). *Bulletin et Annales de la Société Royale Entomologique de Belgique*, 102: 213-239.

Mercet, R.G. 1912. Mimáridos nuevos de España. *Boletin de la Real Sociedad Española de Historia Natural*, 12: 331-337.

Narayanan, E.S. 1961. New record and description of new species of parasites of San Jose scale. *Proceedings of the National Institute of Sciences of India (B)*, 26 (supplement): 20-29.

Narayanan, E.S. & Subba Rao, B.R. 1961. Studies on Indian Mymaridae III. (Hymenoptera: Chalcidoidea). *Beiträge zur Entomologie*, 11: 655-671.

Narayanan, E.S., Subba Rao, B.R. & Kaur, R.B. 1960. Studies on Indian Mymaridae II. (Hymenoptera: Chalcidoidea). *Beiträge zur Entomologie*, 10: 886-890.

Narendran, T.C., Hayat, M. & Sinu, P.A. 2003. A new species and a new record of the genus *Australomymar* Girault (Hymenoptera: Mymaridae) from the Oriental region. *Zoos' Print Journal*, 18: 1059-1060.

Noyes, J.S. 1982. Collecting and preserving chalcid wasps (Hymenoptera: Chalcidoidea). *Journal of Natural History*, 16: 315-334.

Noyes, J. S. & Valentine, E. W. 1989. Mymaridae (Insecta: Hymenoptera)-introduction, and review of genera. *Fauna of New Zealand*, 17: 1-95.

Ogloblin, A.A. 1935. Um (sic) nuevo mimárido de Misiones (Hym. Mymaridae). *Revista de Entomología, Rio de Janeiro*, 5: 59-64.

Ogloblin, A.A. & Annecke, D.P. 1961. Some new Mymaridae from South Africa and Argentina in the genus *Camptoptera* Foerster (Hymenopt.: Chalcidoidea). *Journal of the Entomological Society of Southern Africa*, 24: 293-307.

Perkins, R.C.L. 1912. Parasites of insects attacking sugar cane. *Bulletin of the Hawaiian Sugar Planters' Association Experiment Station (Entomology Series)*, 10: 1-27.

Rehmat, T., Anis, S.B. & Hayat, M. 2009. Record of the Genus *Litus* Haliday (Hymenoptera: Chalcidoidea: Mymaridae) from India, with description of two species. *Journal of Threatened Taxa*, 1 (7): 370-374. (Online Journal).

Schauff, M. E. 1984. The Holarctic genera of Mymaridae (Hymenoptera: Chalcidoidea). *Memoirs of the Entomological Society of Washington*, 12: 1-67.

Soyka, W. 1949. Die systematische Stellung der Familie der "Mymaridae" und deren Aufteilung (Chalcidoidea, Hymenoptera). *Entomologisches Nachrichtenblatt, Burgdorf*, 3(1):12-15.

Soyka, W. 1961. Neue monographische Revision der *Camptoptera* - Gruppe mit den Gattungen *Camptoptera* Förster, *Stichothrix* Förster, *Macrocamptoptera* Girault und *Weranekiella* n.g. (Mymaridae, Chalcidoidea, Hymenoptera). *Publicatiës van het Natuurhistorisch Genootschap in Limburg*, 12: 72-89.

Subba Rao, B. R. 1966. Records of known and new species of mymarid parasites of *Empoasca devastans* Distant from India. *Indian Journal of Entomology*, 28: 187-196.

Subba Rao, B. R. 1989. On a collection of Indian Mymaridae (Chalcidoidea: Hymenoptera). *Hexapoda*, 1: 139-186.

Subba Rao, B. R. & Hayat, M. 1983. Key to the genera of Oriental Mymaridae, with a preliminary catalog (Hymenoptera: Chalcidoidea).– *Contributions of the American Entomological Institute*, 20: 125-150.

Subba Rao, B.R. & Hayat, M. 1985. The Chalcidoidea (Insecta: Hymenoptera) of India and the adjacent countries. Part I. *Oriental Insects*, 19: 163-310.

Subba Rao, B.R. & Hayat, M. 1986. The Chalcidoidea (Insecta: Hymenoptera) of India and the adjacent countries. Part II. A catalogue of Chalcidoidea of India and the adjacent countries. *Oriental Insects*, 20:1-430.

Subba Rao, B. R. & Kaur, R. B. 1959. Studies on Indian Mymaridae-part I. *Proceedings of the Indian Academy of Sciences (B)*, 49: 227-238.

Taguchi, H. 1977a. A new genus belonging to the tribe Mymarini from Japan, Taiwan and Malaysia (Hymenoptera: Mymaridae). *Transactions of the Shikoku Entomological Society*, 13: 137-142.

Taguchi, H. 1977b. Two new species of the genus *Camptoptera* from Taiwan (Hymenoptera: Mymaridae). *Transactions of the Shikoku Entomological Society*, 13: 143-146.

Triapitsyn, S.V. 2001. Species-level taxonomy of the Mymaridae (Hymenoptera): current status and implications for biological control of leafhoppers of economic importance. *Abstracts of papers. International symposium: Parasitic Hymenoptera: taxonomy and biological control. 14-17 May, 2001, Köszeg, Hungary*: 43 (Eds: Thuróczy, C.; Eke, I.; Káldy, J.; Melika, G.) Systematic parasitoid laboratory, Köszeg, Hungary.

Triapitsyn, S.V. & Berezovskiy, V.V. 2002a. Review of the Mymaridae (Hymenoptera, Chalcidoidea) of Primorskii Krai: genera *Chaetomymar* Ogloblin, *Himopolynema* Taguchi, and *Stephanodes* Enock. *Far Eastern Entomologist*, 110: 1-11.

Triapitsyn, S.V. & Berezovskiy, V.V. 2002b. Review of the Mymaridae (Hymenoptera, Chalcidoidea) of Primorskii Krai: genera *Anagroidea* Girault and *Eubroncus* Yoshimoto, Kozlov et Trjapitzin. *Far Eastern Entomologist*, 114: 1-17.

Triapitsyn, S.V. & Berezovskiy, V.V. 2004. Review of the genus *Litus* Haliday, 1833 in the Holarctic and Oriental regions, with notes on the Palaearctic species of *Arescon* Walker, 1846 (Hymenoptera: Mymaridae). *Far Eastern Entomologist*, 141: 1-24.

Triapitsyn, S.V. & Berezovskiy, V.V. 2007. Review of the Oriental and Australian species of *Acmopolynema*, with taxonomic notes on *Palaeoneura* and *Xenopolynema* stat. rev. and description of a new genus (Hymenoptera: Mymaridae). *Zootaxa*, 1455: 1-68.

Triapitsyn, S. V., V. V. Berezovskiy, M. S. Hoddle, and J. G. Morse. 2007. A Review of the Nearctic Species of *Erythmelus* (Hymenoptera: Mymaridae), with a Key and New Additions to the New World Fauna. *Zootaxa*, 1641: 1-64.

Triapitsyn, S.V. & Huber, J.T. 2000. Nadsem. Chalcidoidea 51. Sem. Mymaridae. *Opredeliteli nasekomikh dalinego vostoka Rossii.* 4 (4): 603-614 (Ed: Lera, P.A.) Dalinauka, Vladivostok (ISBN 5-8044-0031-2).

Viggiani, G., 1978a. New species of *Camptoptera* Foerster (Hymenoptera: Mymaridae). *Rev. Suisse Zool.*, 85: 151-156.

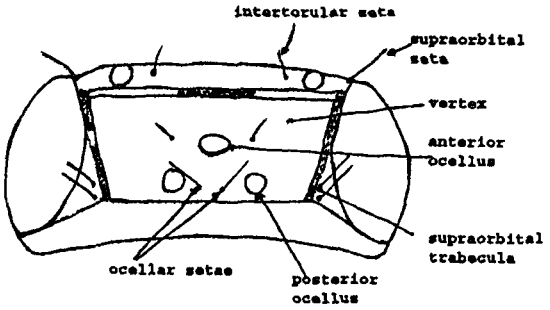
Viggiani, G., 1978b. Una nuova specie di *Eofesteria* Mathot (Mymaridae). *Boll. Soc. Ital.*, 110: 39-41.

Westwood, J.O. 1839. Synopsis of the genera of British insects. *An introduction to the modern classification of insects*, 2 (No 13) (appendix):49-80 London.

Yoshimoto, C.M. 1990. A review of the genera of New World Mymaridae (Hymenoptera: Chalcidoidea). *Flora & Fauna Handbook*, 7: 1-166. Sandhill Crane Press Inc., Gainsville, Florida.

Yoshimoto, C.M., Kozlov, M.A. & Trjapitzin, V.A. 1972. A new subfamily of Mymaridae (Hymenoptera, Chalcidoidea). [In Russian]. *Entomologicheskoe Obozrenie,* 51: 878-885.

Zeya, S.B. & Hayat, M. 1995. A revision of the Indian species of *Gonatocerus* Nees (Hymenoptera: Mymaridae). *Oriental Insects*, 29: 47-160.



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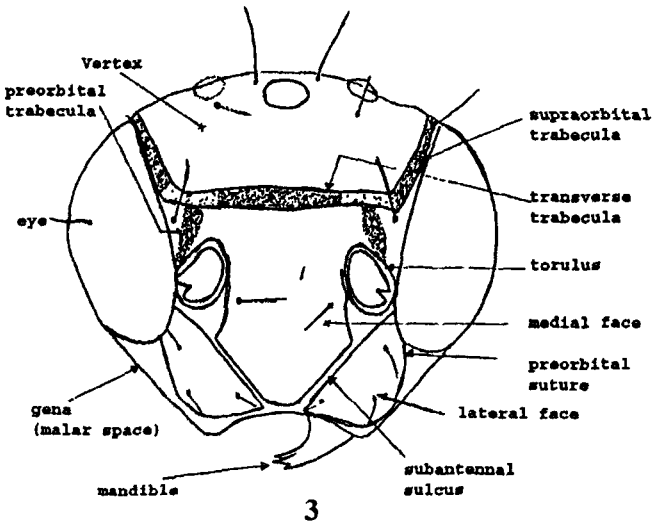

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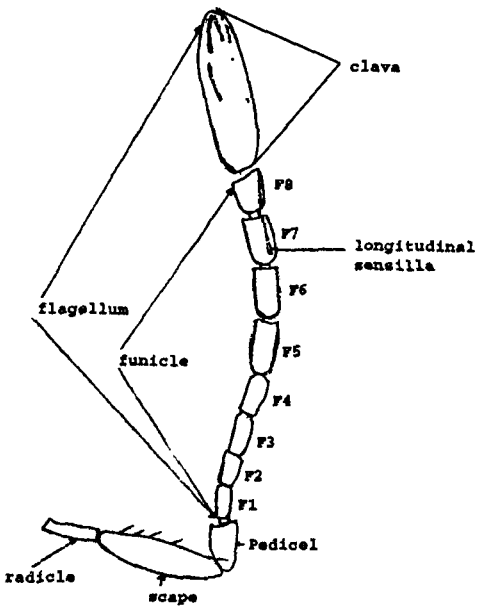

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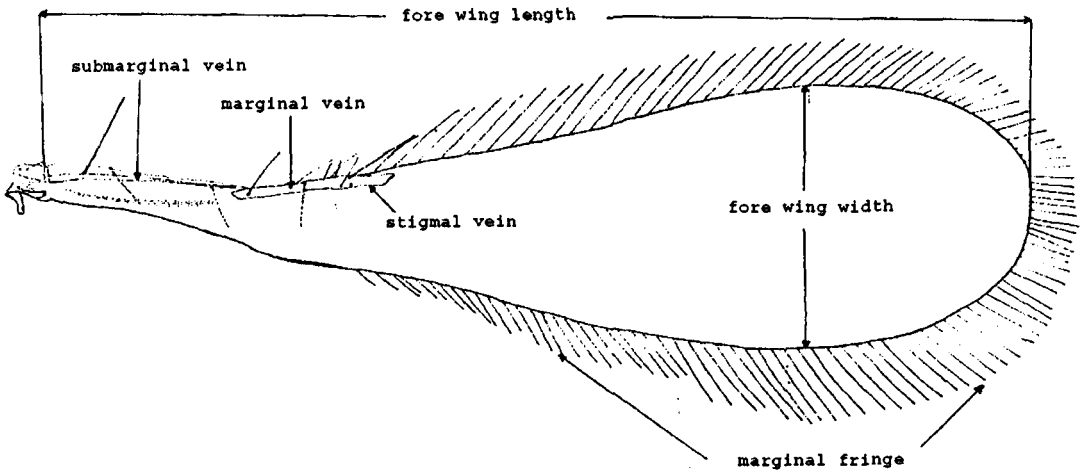
Figs. 2-4. Explanation of terms of the family Mymaridae. Female: 2, head dorsum, generalized; 3, head frontal; 4, antenna.



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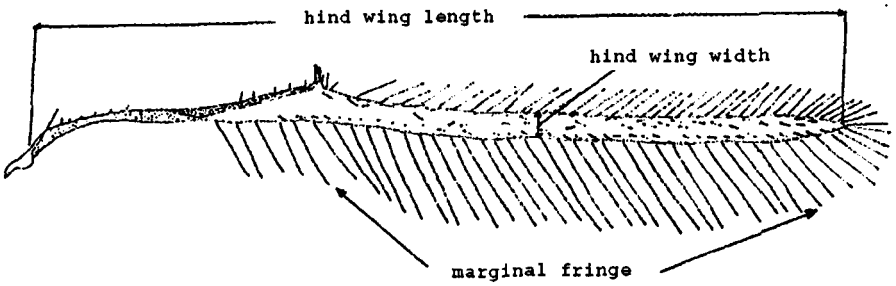

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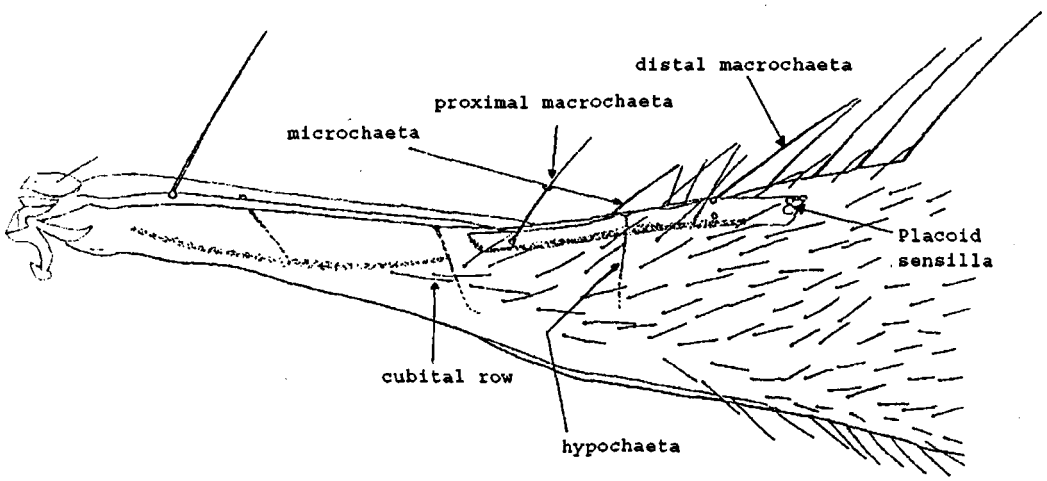

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Figs. 5-7. Explanation of terms of the family Mymaridae. Female: 5, fore wing; 6, fore wing basal part enlarged; 7, hind wing.

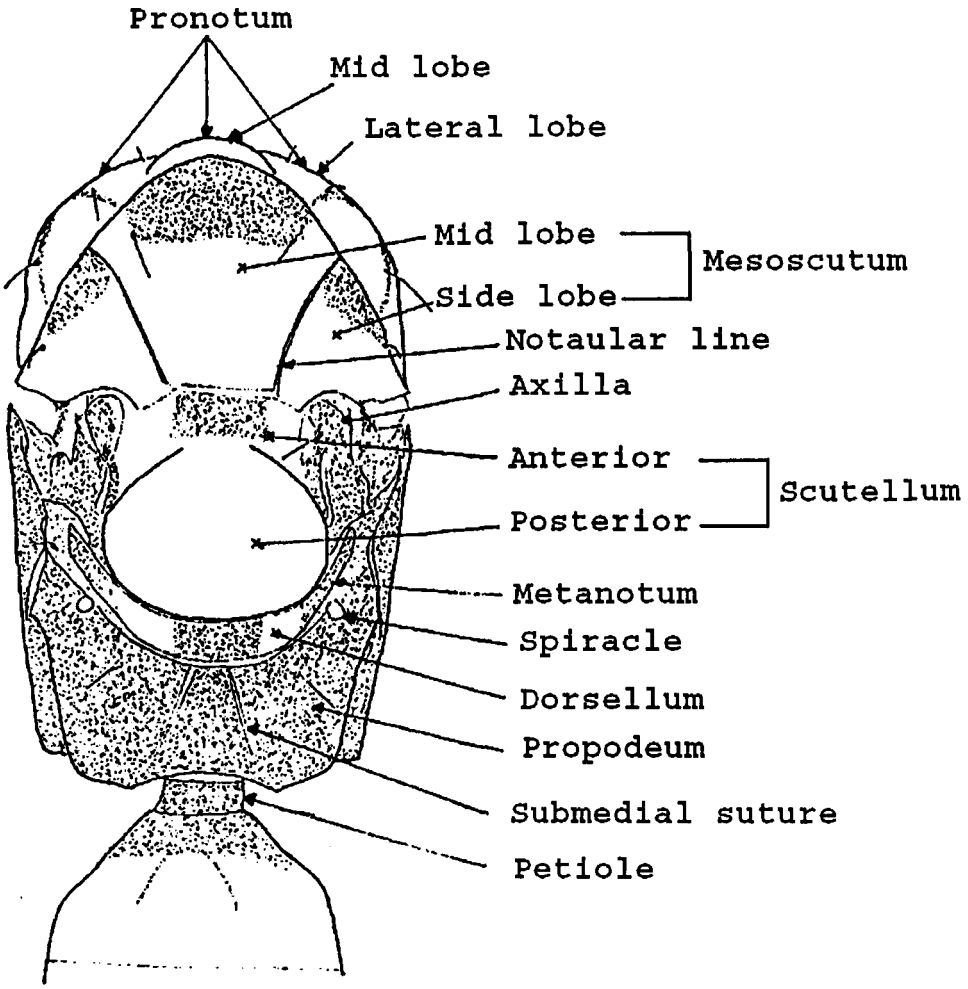

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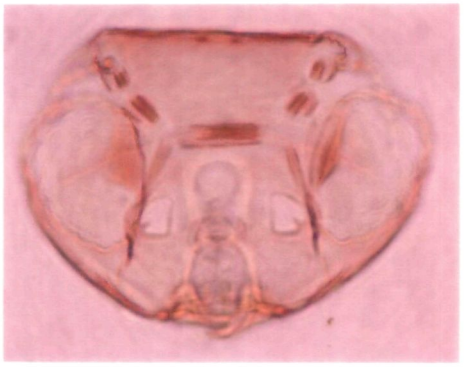
Fig. 8. Explanation of terms of the family Mymaridae. Female: 8, thorax and part of gaster, dorsal.



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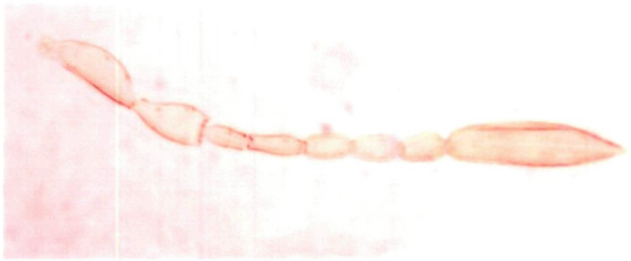

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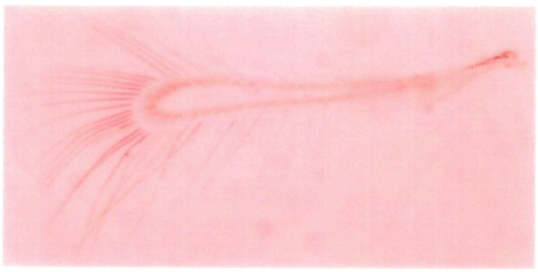

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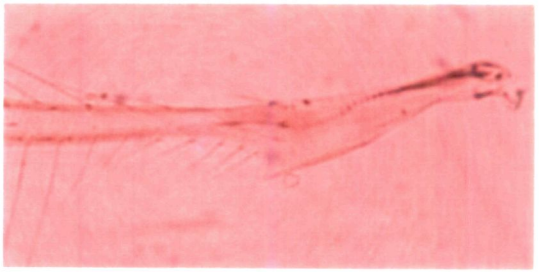

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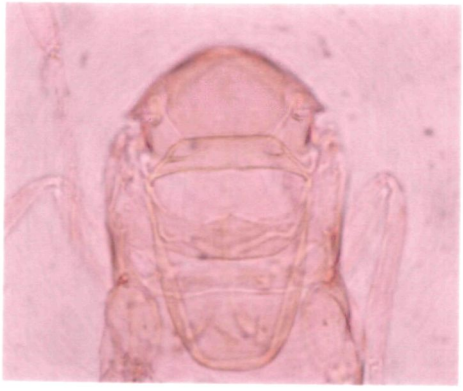

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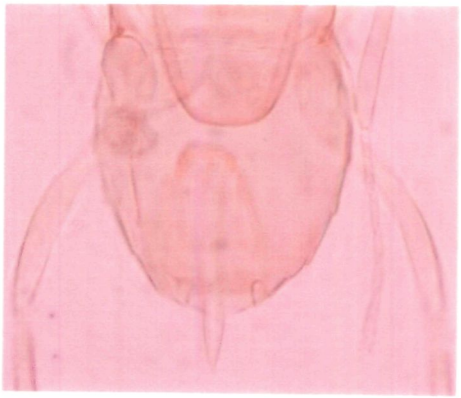

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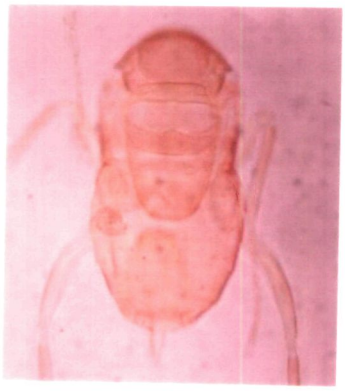

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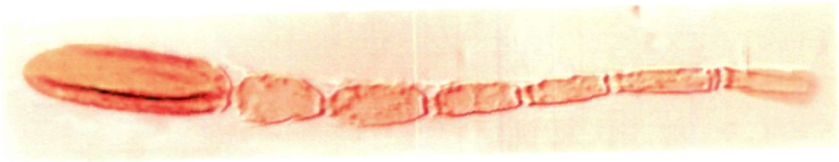
Figs.9-15. *Alaptus jowainus* sp. nov. Female: 9, Head frontal; 10, antenna; 11, fore wing; 12, fore wing, basal part; 13, thorax; 14, gaster with mesophragma; 15, female, body dorsal.



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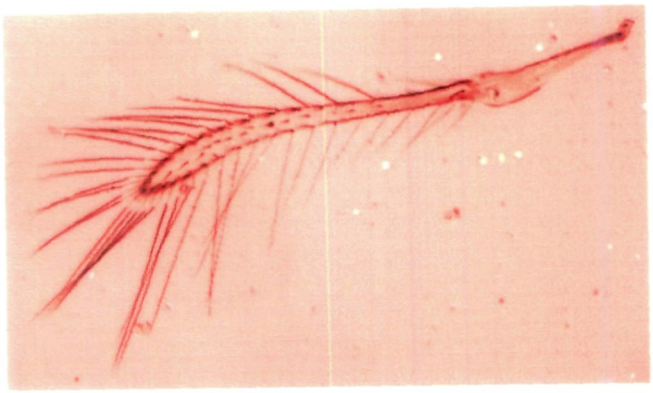

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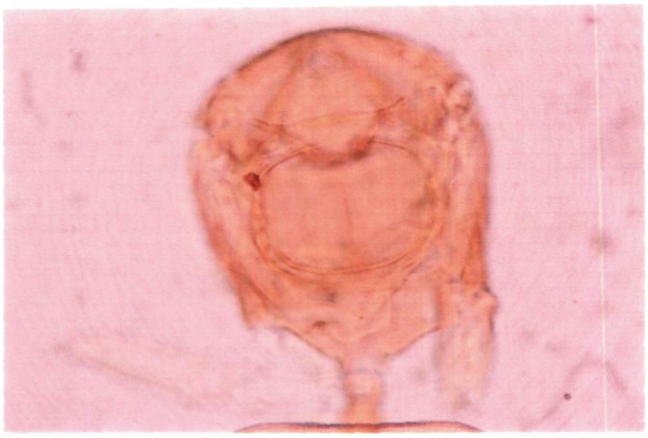

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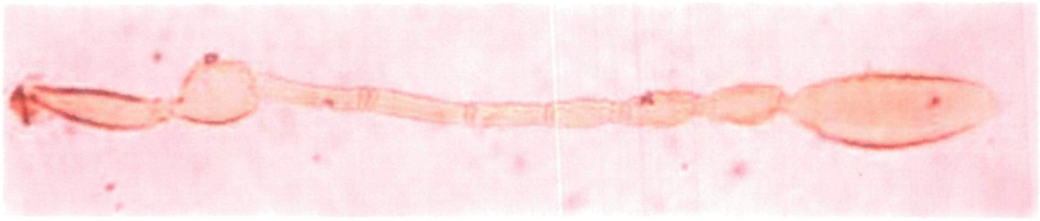
Figs. 16-18. *Camptoptera hayati* sp. nov. Female: 16A, antenna; 16B, fore wing; 18, thorax, showing sculpture; 19, female body.



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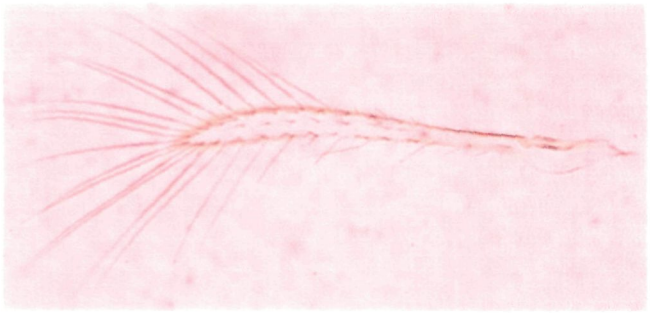

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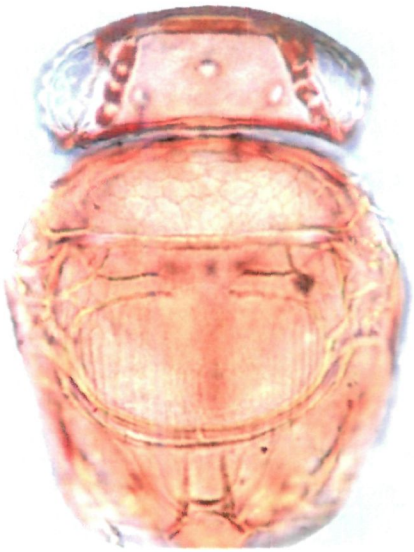

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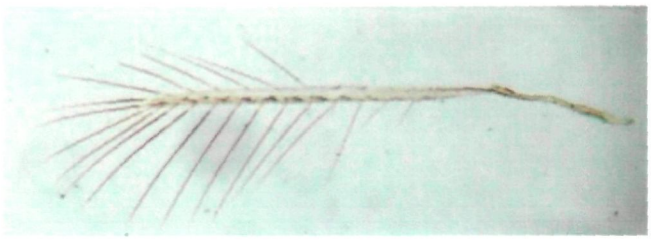

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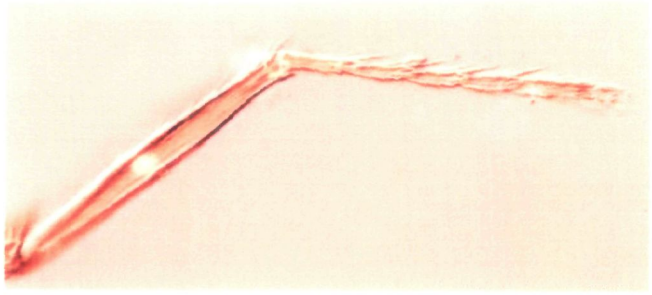

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Figs. 19-24. *Camptoptera assamensis* sp. nov. Female: 19, antenna; 20, fore wing; 21, hind wing; 22, head and thorax, showing sculpture; 23, tarsal segments; 24, gaster, showing petiole (with lateral projections) and ovipositor.

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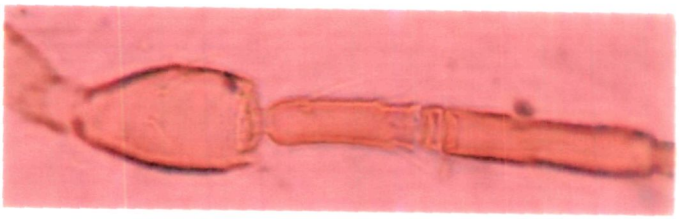

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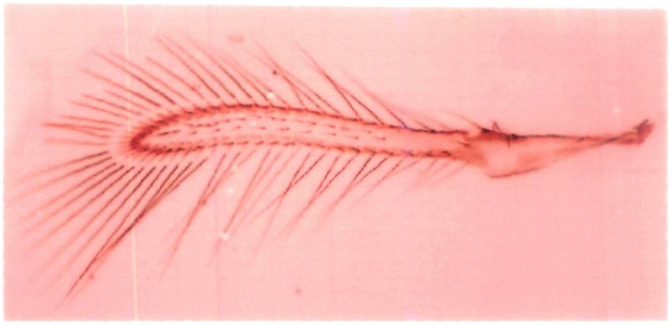

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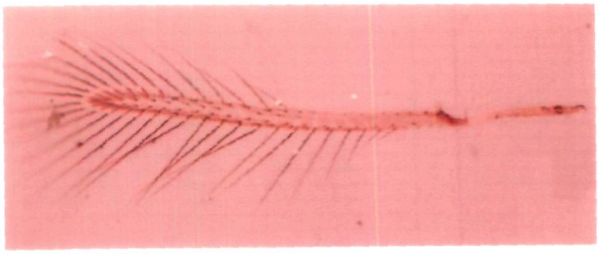

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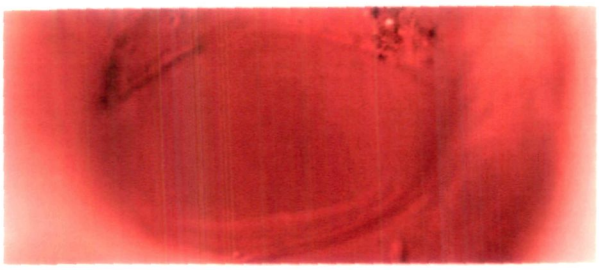

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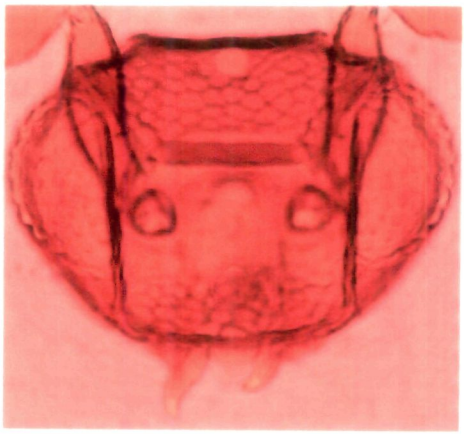
Figs.25-29. *Camptoptera sakaii*. Female: 25, antenna; 26, antenna, enlarged showing ring segment; 27, fore wing; 28, hind wing; 29, thorax, showing sculpture on scutellum.



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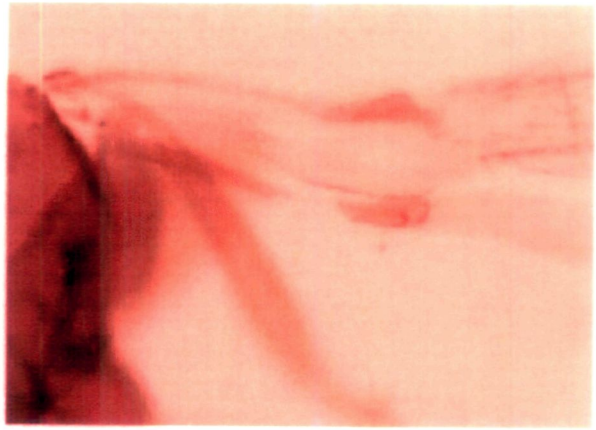

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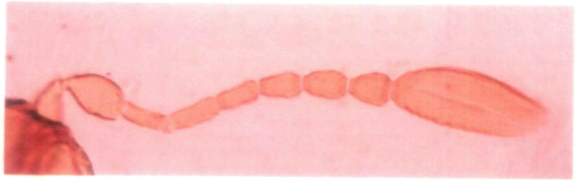

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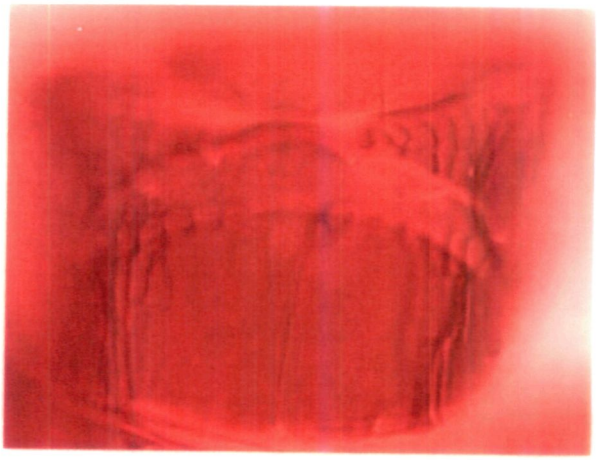

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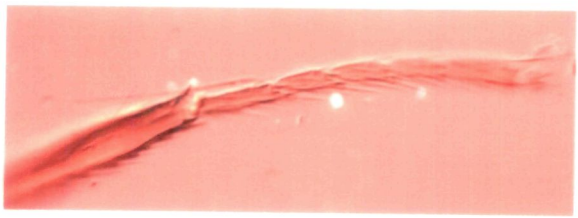

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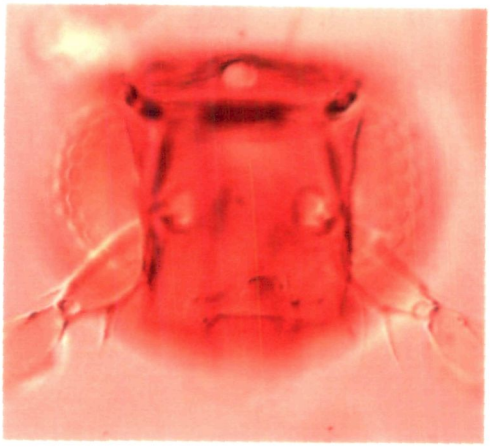
Figs. 30-35. *Camptoptera matcheta*. Female: 30, head frontal ; 31, antenna; 32, fore wing, basal part; 33, thorax, showing sculpture; 34, tarsal segments; 35, gaster showing petiole and ovipositor.



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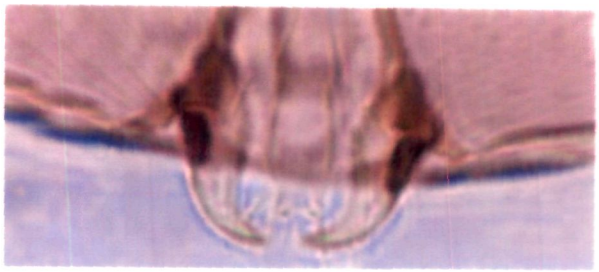

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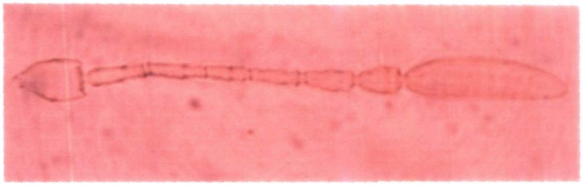

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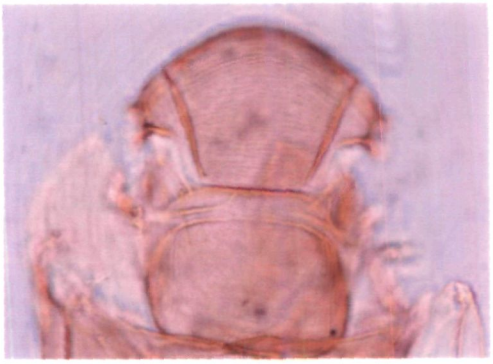

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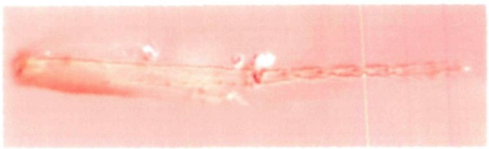

42

Figs. 36-42. *Camptoptera dravida*. Female: 36, head frontal; 37, mandibles; 38, antenna, male; 39, antenna, female; 40, fore wing; 41, thorax, showing sculpture; 42, tarsal segments.

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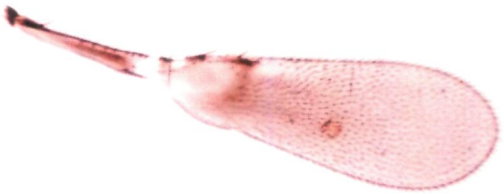

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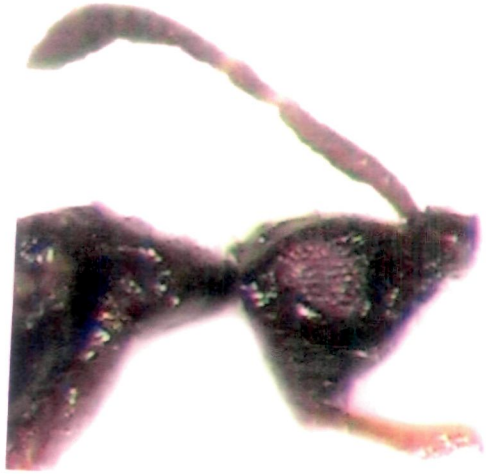

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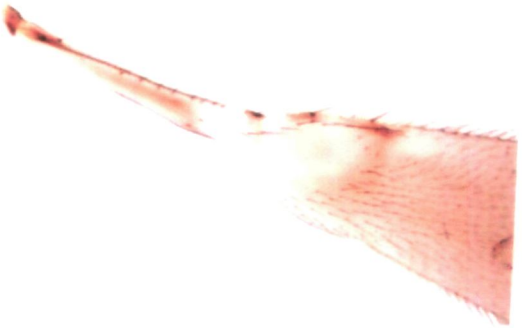

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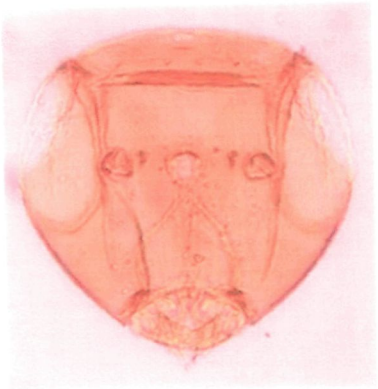
Figs. 43-48. *Eubroncus indicus*. Female: 43, body lateral; 44, head and pronotum lateral; 45, antenna; 46, fore wing; 47, fore wing, basal part; 48, hind wing.



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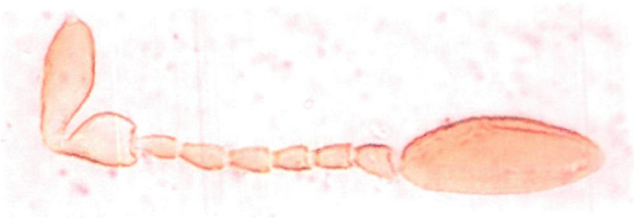

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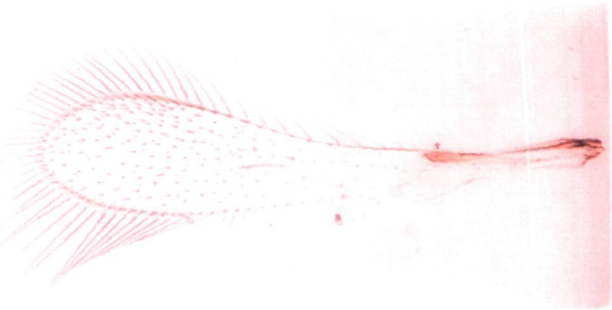

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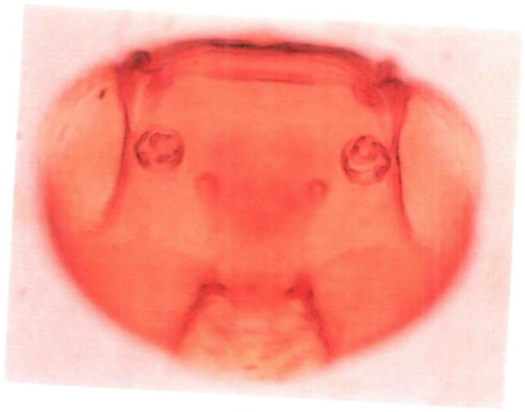
Figs. 49-54. *Himopolynema hishimonus*. Female: 49, Head frontal; 50, antenna, male; 51, antenna, female; 52, fore wing; 53, thorax, showing propodeal carina; 54, gaster, showing ovipositor.



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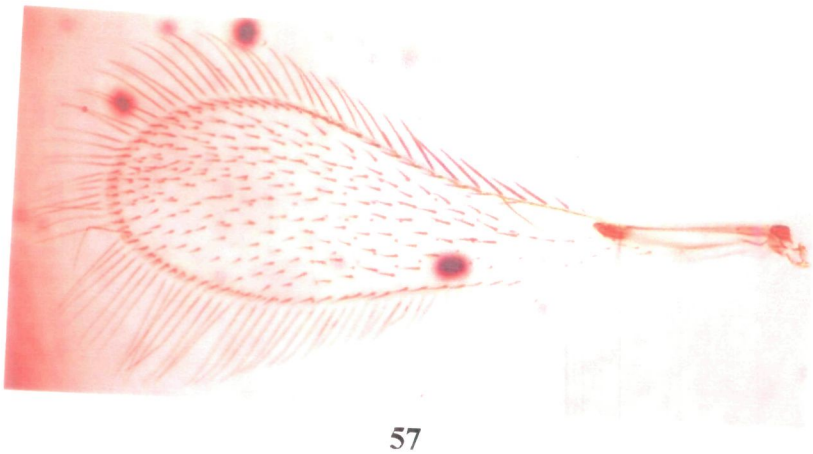

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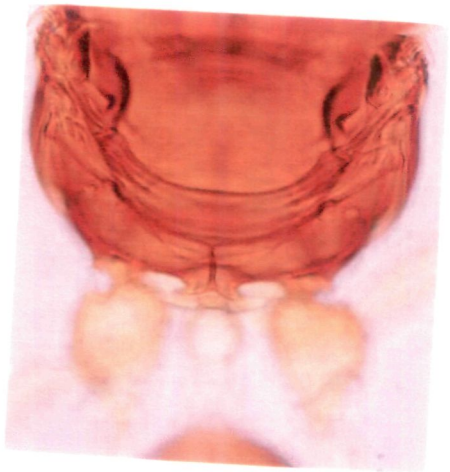

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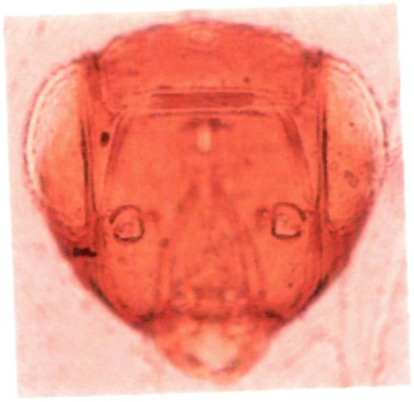
Figs.55-59. *Himopolynema haflongum*. Female: 55, Head frontal; 56, antenna; 57, fore wing; 58, thorax, showing propodeal carina; 59, female, body dorsal.



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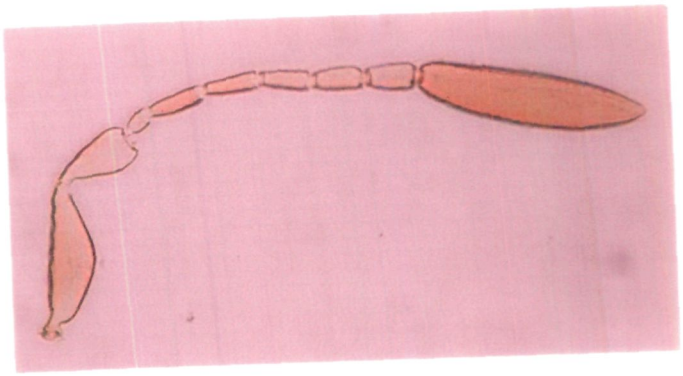

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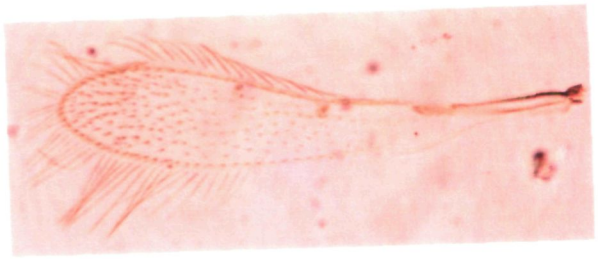

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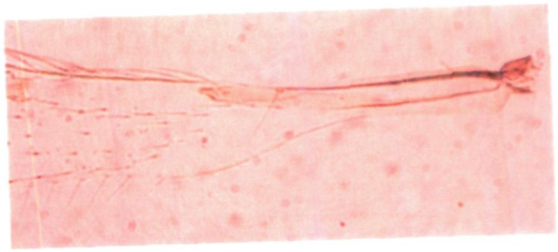

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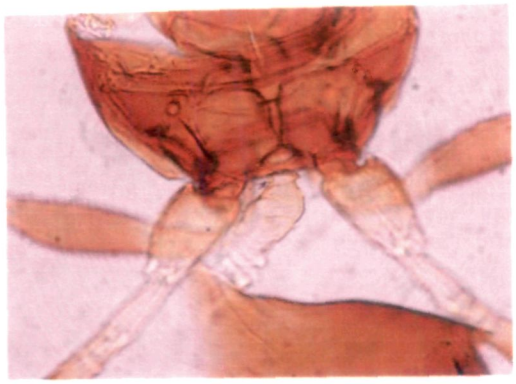

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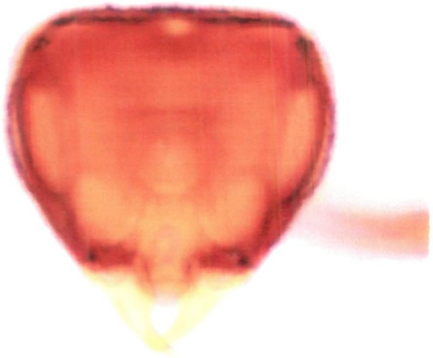
Figs.60-65. *Himopolynema longiclavatum*. Female: 60, Head frontal; 61, antenna; 62, fore wing; 63, fore wing, basal part; 64, thorax showing propodeum; 65, gaster, showing ovipositor.



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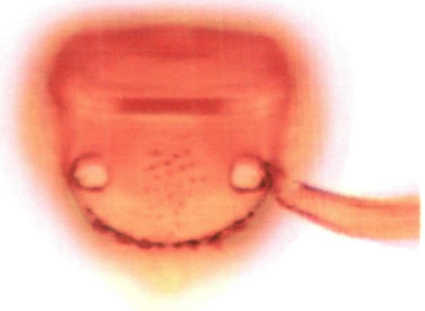

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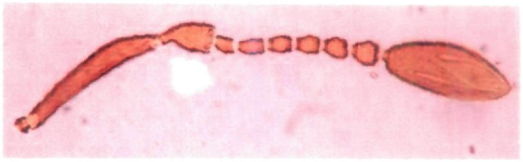

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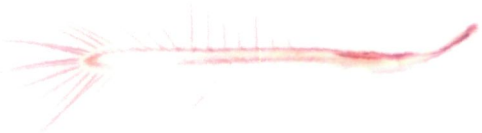

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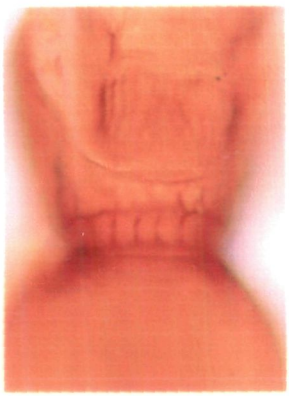

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Figs. 66-72. *Litus huberi*. Female: 66, head frontal; 67; head frontal, showing tubercles; 68, head, dorso-lateral; 69, antenna; 70, fore wing; 71, thorax, showing sculpture; 72, thorax and gaster.

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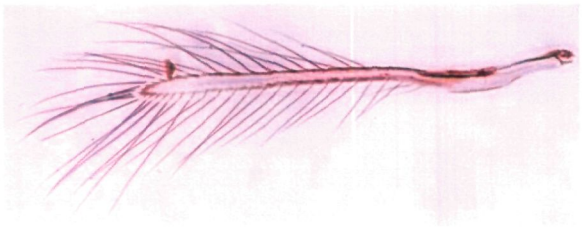

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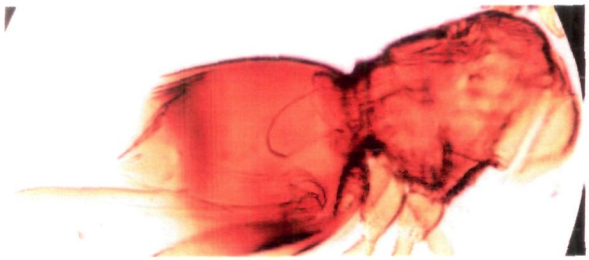
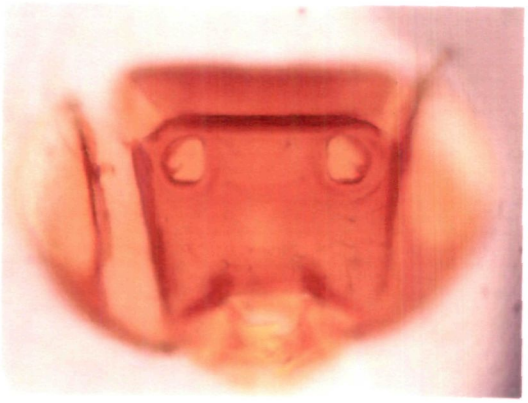


77

Figs. 73-77. *Litus triapitsyni*. Female: 73, head, dorso-lateral; 74; antenna; 75, fore wing; 76, hind wing; 77, thorax and gaster.



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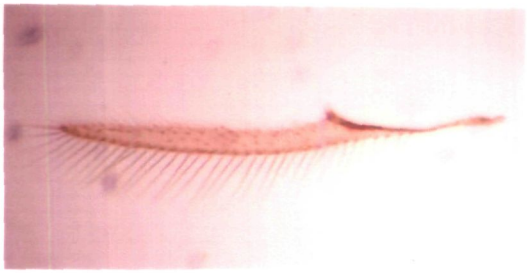

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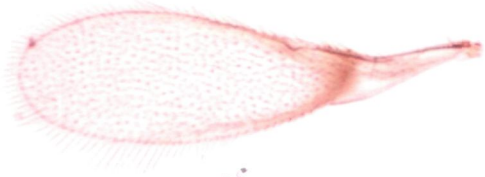

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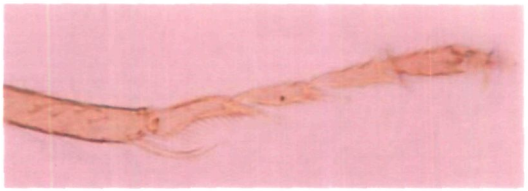

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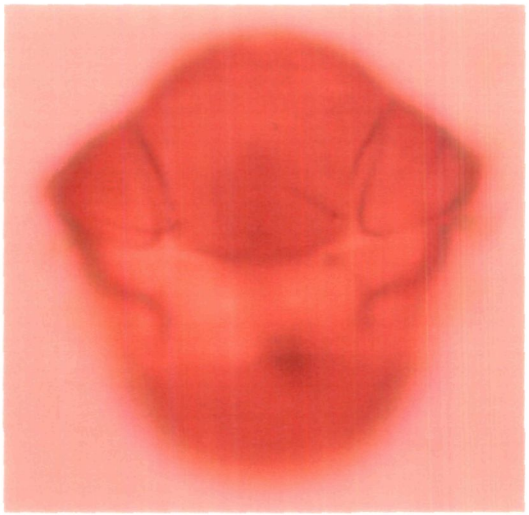

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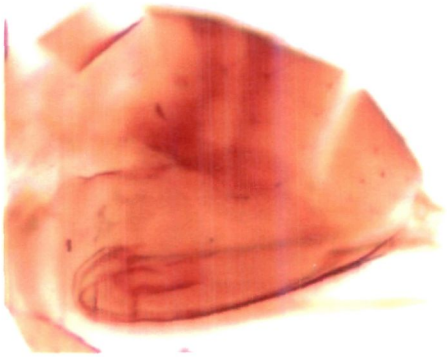
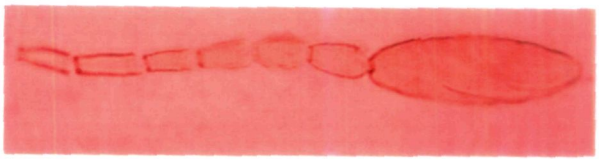


84

Figs. 78-84. *Pseudanaphes sikkimianus* sp. nov. Female: 78, head dorsal; 79, antenna; 80, fore wing; 81, hind wing; 82, thorax; 83, tarsal segments; 84, gaster, showing ovipositor.



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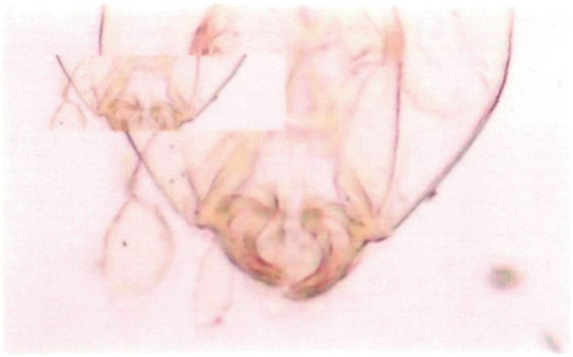

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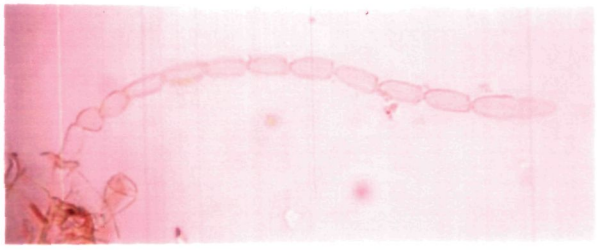

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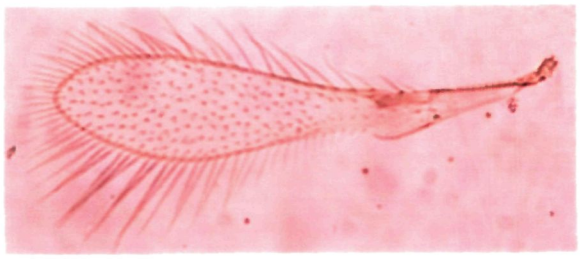

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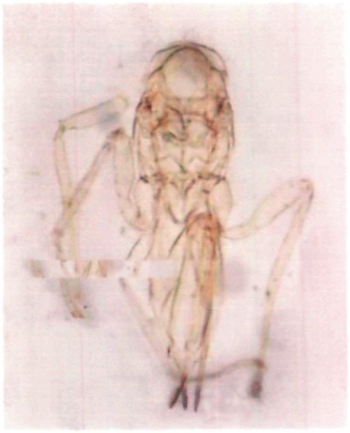

91

Figs. 85-91. *Stethynium empoascae*. Female: 85, Head frontal; 86, antenna; 88, fore wing; 89, hind wing; 90, thorax showing mesophragma; 91, female body, showing ovipositor. Male: 87, antenna.

Appendix

Checklist of Indian Mymaridae

The genera, and under each genus, the species are arranged in alphabetical order. As this is a checklist, detail citations are not given. Synonymous names for the valid genera and species, if any, immediately follow the valid name of the genus or species. Only distribution of the species within India is given by States, and distribution outside India is given in parenthesis either by Regions or Countries, following the Indian distribution.

1. **Genus *Acmopolynema* Ogloblin, 1946**

   (Synonyms: *Grangeriella* Soyka, 1956; *Neonarayanella* Husain & Farooqui, 1996; *Baburia* Hedquist, 2004).

   1.1 *bimaculatum* Subba Rao, 1989 [Karnataka, Kerala. (Indonesia; Taiwan)]

   1.2 *incognitum* (Narayanan, Subba Rao & Kaur, 1061) [Delhi, Karnataka, Uttar Pradesh]

   1.3 *indochinense* (Soyka, 1956) [Uttarakhand. (Australia, Indonesia, Malaysia, Thailand, Vietnam)]

   (Synonym: *Acmopolynema himalum* Hayat & Anis, 1999b)

   1.4 *malabricum* Subba Rao, 1989 [Kerala]

   1.5 *orientale* (Narayanan, Subba Rao & Kaur, 1960) [Delhi, Karnataka, Kerala, Himachal Pradesh, Tamil Nadu, Uttar Pradesh, West Bengal. (Sri Lanka; Thailand; China)].

   (Synonyms: *Acmopolynema maculata* Subba Rao, 1989; *Acmopolynema nixoni* Subba Rao, 1989; *Acmopolynema dravida* Subba Rao, 1989).

1.6 *problema* Triapitsyn & Berezovskiy, 2007 [Karnataka].

1.7 *shrawastianum* Hayat & Anis, 2008 [Uttar Pradesh]

1.8 *tachikawai* Taguchi, 1971 [Karnataka. (Japan; Malaysia; Sri Lanka)].

2. Genus *Alaptus* Westwood, 1839

(Synonyms: *Parvulinus* Mercet, 1912; *Metalaptus* Malenotti, 1917).

2.1 *delhiensis* Mani, 1942 [Delhi].

2.2 *jowainus* sp. nov. [Meghalaya] present dissertation.

2.3 *magnanimus* Annandale, 1909 [West Bengal].

2.4 *ramakrishnai* Mani, 1942 [Tamil Nadu].

3. Genus *Anagroidea* Girault, 1915

(Synonym: *Dahmsia* Doutt, 1975).

3.1 *himalayana* (Mani & Saraswat, 1973) [Himachal Pradesh, West Bengal].

4. Genus *Anagrus* Haliday 1833

(Synonyms: *Pteratomus* Packard, 1864; *Paranagrus* Perkins, 1905; *Anagrella* Bakkendorf, 1962).

4.1 *columbi* Perkins, 1905 [Andhra Pradesh. (USA: Hawaiian Islands)].

4.2 *dalhousieanus* Mani & Saraswat, 1973 [Himachal Pradesh].

4.3 *empoascae* Dozier, 1932 [Delhi. (Haiti)].

4.4 *flaveolus* Waterhouse, 1913 [Andhra Pradesh, Orissa. (Malaysia; Pakistan; Philippines; Sri Lanka)].

4.5 *optabilis* (Perkins, 1905) [Andhra Pradesh, Orissa. (Fiji; Malaysia; Taiwan; Thailand)].

4.6 *perforator* (Perkins, 1905) [Orissa. (Fiji; Philippines)].

5. **Genus *Anaphes* Haliday, 1833**

(Synonyms: *Panthus* Walker, 1846; *Patasson* Walker, 1846; *Flabrinus* Rondani, 1877; *Anaphoidea* Girault, 1909; *Clinomymar* Kieffer, 1913; *Yungaburra* Girault, 1933; *Synanaphes* Soyka, 1946; *Ferrierella* Soyka, 1946; *Hofenederia* Soyka, 1946; *Fulmekiella* Soyka, 1946; *Antoniella* Soyka, 1950; *Stammeriella* Soyka, 1950, *Mariella* Doutt, 1950; *Austranaphes* Ogloblin, 1962).

Indetermined species from several Indian States in ZDAMU.

6. **Genus *Arescon* Walker, 1846**

(Synonyms: *Leimacis* Foerster, 1847; *Xenomymar* Crawford, 1913; *Neurotes* Enock, 1914).

6.1 *enocki* (Subba Rao & Kaur, 1956) [Bihar, Delhi, Gujarat, Himachal Pradesh, Karnataka, Maharashtra].

6.2 *mudigerensis* Subba Rao, 1989 [Karnataka].

7. **Genus *Australomymar* Girault, 1929**

(Synonym: *Nesetaerus* Doutt, 1955)

7.1 *formosum* Narendran & Hayat, 2003 [Karnataka].

8. **Genus *Camptoptera* Foerster, 1856**

(Synonyms: *Stichothrix* Foerster, 1856; *Eomymar* Perkins, 1912; *Congolia* Ghesquiere, 1942; *Sphegilla* Debauche, 1948; *Wertanekiella* Soyka, 1961; *Zemicamptoptera* Ogloblin & Annecke, 1961 as subgenus of *Camptoptera*; *Staneria* Mathot, 1966).

8.1 *ambrae* Viggiani, 1978a [Tamil Nadu].

8.2 *assamensis* sp. nov. [Guwahati] present dissertation.

8.3 *brevifuniculata* Subba Rao, 1989 [Tamil Nadu].

8.4 *dravida* Subba Rao, 1989 [Karnataka, Tamil Nadu, Uttar Pradesh].

8.5 *hayati* sp. nov. [Assam] present dissertation.

8.6 *kannada* Subba Rao, 1989 [Karnataka].

8.7 *longifuniculata* Viggiani, 1978a [Tamil Nadu].

8.8 *matcheta* Subba Rao, 1989 [Karnataka, Uttar Pradesh].

8.9 *sakaii* Taguchi, 1977b [Assam. (Taiwan)].

9. Genus *Dicopomorpha* Ogloblin, 1955

(Synonyms: *Chromodicopus* Ogloblin, 1955; *Dicopulus* Ogloblin, 1955).

9.1 *indica* (Subba Rao, 1989) [Karnataka].

10. Genus *Eofoersteria* Mathot, 1966

10.1 *secunda* Viggiani, 1978b [Tamil Nadu].

11. Genus *Erythmelus* Enock, 1909

(Synonyms: *Enaesius* Enock, 1909; *Parallelaptera* Enock, 1909; *Anthemiella* Girault, 1911; *Erythmellelus* Viggiani & Jesu, 1985).

11.1 *flavovarius* (Walker, 1846) [Delhi. (Cosmopolitan)].

(Synonym: *Erythmelus empoascae* Subba Rao, 1966)

11.2 *helopeltidis* Gahan, 1949 [Andhra Pradesh, Uttar Pradesh. (Malaysia)].

11.3 *panchamae* (Subba Rao, 1989) [Tamil Nadu].

11.4 *teleonemiae* (Subba Rao, 1984) [Karnataka, Tamil Nadu. (Iraq)].

(Synonym: *Parallolaptera polyphaga* Livingstone & Yacoob, 1990).

12. Genus *Eubroncus* Yoshimoto, Kozlov & Trjapitzin, 1972

(Synonym: *Stomarotrum* Yoshimoto, Kozlov & Trjapitzin, 1972).

12.1 *indicus* Hayat & F.R. Khan, 2009 [West Bengal].

13. Genus *Gonatocerus* Nees, 1834

(Synonyms: *Lymaenon* Walker, 1846; *Rachistus* Foerster, 1847; *Cosmocomoidea* Howard, 1908; *Oophilus* Enock, 1909; *Agonatocerus* Girault, 1913; *Gonatoceroides* Girault, 1913; *Gastrogonatocerus* Ogloblin, 1935).

Asulcifrons species-group.

13.1 *asculifrons* Zeya, in Zeya & Hayat, 1995 [Assam].

13.2 *devikulamus* Mani & Saraswat, 1973 [Tamil Nadu].

13.3 *similis* Gupta & Poorani, 2008 [Karnataka].

Ater species-group.

13.4 *ater* Foerster, 1841 [Andhra Pradesh, Assam, Bihar, Delhi, Kerala, Uttar Pradesh. (Palaearctic region)].

(Synonyms: *Lymaenon indicus* Subba Rao & Kaur, 1959; *Lymaenon nigroides* Narayanan & Subba Rao, 1961; *Lymaenon empoascae* Subba Rao, 1966).

13.5 *bialbifuniculatus* Subba Rao, 1989 [Tamil Nadu].

13.6 *fulvipodus* Subba Rao, 1989 [Kerala].

13.7 *kodaianus* (Mani & Saraswat, 1973) [Tamil Nadu].

13.8 *longiterebratus* Subba Rao, 1989 [Kerala].

13.9 *monticolus* Zeya, in Zeya & Hayat, 1995 [Uttarakhand].

13.10 *sahadevani* (Subba Rao & Kaur, 1959) [Delhi, Jharkhand, Kerala, Uttar Pradesh].

13.11 *trialbifuniculatus* Subba Rao, 1989 [Karnataka].

13.12 *udakamundus* Mani & Saraswat, 1973 [Tamil Nadu].

13.13 *unicolouratus* Subba Rao, 1989 [Delhi].

Sulphuripes species-group.

13.14 *edentulus* Zeya, in Zeya & Hayat, 1955 [Kerala].

13.15 *huberi* Zeya, in Zeya & Hayat, 1995 [Kerala].

13.16 *longicornis* Nees, 1834 [Assam, Delhi, Jammu & Kashmir, Kerala, Madhya Pradesh, Orissa, Tamil Nadu, Uttar Pradesh. (Palaearctic region)].

(Synonyms: *Lymaenon shasthryi* Subba Rao & Kaur, 1959; *Gonatocerus uttarodeccanus* Mani & Saraswat, 1973).

13.17 *orientalis* Zeya, in Zeya & Hayat, 1995 [Andhra Pradesh, Meghalaya, Pondicherry, Tamil Nadu].

13.18 *shamimi* Subba Rao & Hayat, 1986 [Bihar, Jharkhand, Uttar Pradesh].

(For *Gonatocerus terebrator* Shamim & Shafee, 1984. Preoccupied).

13.19 *sulphuripes* (Foerster, 1847) [Himachal Pradesh. (Palaearctic)].

13.20 *tarae* (Narayanan & Subba Rao, 1961) [Assam, Andhra Pradesh, Bihar, Jammu & Kashmir, Kerala, Karnataka, Maharashtra, Meghalaya, Tamil Nadu, Uttarakhand, Uttar Pradesh].

(Synonym: *Gonatocerus alami* Shamim & Shafee, 1984).

13.21 *utkalensis* Subba Rao, 1989 [Assam, Orissa].

Litoralis species-group.

13.22 *bakrotus* Mani & Saraswat, 1973 [Himachal Pradesh].

13.23 *bashai* Zeya, in Zeya & Hayat, 1995 [Assam].

13.24 *berijamus* Mani & Saraswat, 1973 [Tamil Nadu].

13.25 *bicoloriventris* Zeya, in Zeya & Hayat, 1995 [Bihar, Karnataka, Uttar Pradesh].

13.26 *bouceki* Zeya, in Zeya & Hayat, 1995 [Bihar, Uttar Pradesh].

13.27 *brevifuniculatus* Subba Rao, 1970 [Maharashtra, Punjab, Rajasthan, Tamil Nadu. (Pakistan; Indonesia)].

13.28 *breviterebratus* Subba Rao, 1989 [Karnataka, Uttar Pradesh].

13.29 *delhiensis* Narayanan & Subba Rao, 1961) [Bihar, Delhi, Himachal Pradesh, Karnataka, Kerala, Tamil Nadu, Uttar Pradesh].

(Synonyms: *Gonatocerus relictus* Mani & Saraswat, 1973; *Gonatocerus noyesi* Subba Rao, 1989; *Gonatocerus virgatus* Subba Rao, 1989).

13.30 *devitatakus* Mani & Saraswat, 1973 [Tamil Nadu].

13.31 *longior* Soyka, 1946 [Uttar Pradesh. (Palaearctic)].

13.32 *maculatus* Zeya, in Zeya & Hayat, 1995 [Uttar Pradesh].

13.33 *malanadensis* Subba Rao, 1989 [Karnataka].

13.34 *munnarus* Mani & Saraswat, 1973 [Andhra Pradesh, Jammu & Kashmir, Kerala, Maharashtra, Madhya Pradesh, Tamil Nadu, Uttar Pradesh. (Bangladesh; Indonesia)].

13.35 *narayani* (Subba Rao, 1959) [Andhra Pradesh, Assam, Bihar (Chakradharpur), Himachal Pradesh, Kerala, Tamil Nadu, Uttar Pradesh. (Bangladesh; Thailand)].

13.36 *pahlgamensis* (Narayanan, 1961) [Andhra Pradesh, Assam, Bihar (Gaya), Jharkhand (Chakradharpur), Jammu & Kashmir, Kerala, Maharashtra, Orissa, Tamil Nadu. (Japan)].

(Synonyms: *Gonatocerus kanheriensis* Mani & Saraswat, 1973; *Gonatocerus aligarhensis* Shamim & Shafee, 1984).

13.37 *ramakrishnai* (Subba Rao & Kaur, 1959) [Delhi].

13.38 *spectabilis* Zeya, in Zeya & Hayat, 1995 [Uttar Pradesh].

13.39 *tamilanus* Mani & Saraswat, 1973 [Kerala, Tamil Nadu, Uttar Pradesh].

13.40 *venustus* Zeya, in Zeya & Hayat, 1995 [Bihar (Gaya), Jharkhand, Kerala, Meghalaya, Tamil Nadu].

Species *incertae sedis*

13.41 *longicrus* Kieffer, 1913 [Orissa].

14. Genus *Himopolynema* Taguchi, 1977

14.1 *haflongum* Hayat & Singh, 2003 [Assam. West Bengal].

14.2 *hexatricha* Hayat & Basha, 2003 [Assam].

14.3 *hishimonus* Taguchi, 1977a [Andhra Pradesh, Assam, Bihar, Uttar Pradesh, West Bengal. (Japan)].

14.4 *indicum* Hayat & Basha, 2003 [Assam].

14.5 *longiclavatum* Hayat & Anis, 1999a [Karnataka, Kerala, West Bengal].

15. Genus *Litus* Haliday, 1833

15.1 *huberi* Rehmat & Anis, 2009 [Assam].

15.2 *triapitsyni* Rehmat & Hayat, 2009 [Assam].

16. Genus *Mymar* Curtis, 1829

(Synonymy: *Pterolinononyktera* Maláč, 1943).

16.1 *roopum* Hayat & F.R. Khan, 2008 [Uttar Pradesh].

16.2 *schwanni* Girault, 1912 [Uttarakhand, Uttar Pradesh, Orissa. (Australia)].

16.3 *taprobanicum* Ward, 1875 [Delhi, Himachal Pradesh, Madhya Pradesh, Orissa, Rajasthan, Tamil Nadu, Uttarakhand, Uttar Pradesh. (Sri Lanka; Cosmopolitan)].

(Synonym: *Mymar indica* Mani, 1942).

17. Genus *Narayanella* Subba Rao, 1976

17.1 *thornypoda* (Narayanan & Subba Rao, 1961) [Bihar, Karnataka, Maharashtra, Uttar Pradesh, Tamil Nadu, West Bengal].

(Synonyms: *Anagrus khandalus* Mani & Saraswat, 1973; *Narayanella nigriclavata* Husain & Agarwal, 1983).

18. Genus *Ooctonus* Haliday, 1833

(Synonym: *Sphecomicrus* Walker, 1846)

18.1 *himalayus* Subba Rao, 1989 [Himachal Pradesh].

18.2 *nigrotestaceus* Subba Rao, 1989 [Tamil Nadu].

19. Genus *Palaeoneura* Waterhouse, 1915

(Synonyms: *Chaetomymar* Ogloblin, 1946; *Acanthomymar* Subba Rao, 1970).

19.1 *bagicha* (Narayanan, Subba Rao & Kaur, 1960) [Delhi, Himachal Pradesh, Maharashtra, Punjab, Uttar Pradesh].

(Synonym: *Mymarilla deccana* Mani & Saraswat, 1973).

19.2 *indopeninsularis* (Mani & Saraswat, 1973) [Tamil Nadu].

19.3 *sophoniae* Huber, 2003 [Uttar Pradesh. (Hawaiian Islands; China)]

19.4 *unimaculata* (Hayat & Anis, 1999b) [Kerala, Jammu & Kashmir, Karnataka. (Japan; Papua New Guinea)].

20. Genus *Polynema* Haliday, 1833

(Synonyms; *Eutriche*, 1834; *Doriclytus* Foerster, 1847; *Maidliella* Soyka, 1946; *Novickyella* Soyka, 1946; *Barypolynema* Ogloblin, 1946; *Notopolynema* Ogloblin, 1960; *Tarphypolynema Ogloblin*, 1960; *Restisoma* Yoshimoto, 1990; *Formicomymar* Yoshimoto, 1990; *Dorypolynema* Hayat & Anis, 1999c. As subgenus of *Polynema*).

Subgenus *Polynema* s.str.

20.1 *anamalaiense* Mani & Saraswat, 1973 [Himachal Pradesh].

20.2 *assamense* Hayat & Singh, 2001 [Assam].

20.3 *brevicarinae* Annecke & Doutt, 1961 [Bihar, Delhi, Karnataka, Kerala, Maharashtra, Orissa, Pondicherry, Tamil Nadu, Uttarakhand, Uttar Pradesh. (South Africa)].

(Synonyms: *Polynema* (*Polynema*) *indica* Narayanan & Subba Rao, 1961; *P.* (*P.*) *truncata* Narayanan & Subba Rao, 1961).

20.4 *crassa* Mani & Saraswat, 1973 [Himachal Pradesh].

20.5 *dhenkunde* Mani & Saraswat, 1973 [Himachal Pradesh].

20.6 *dunense* Hayat & Anis, 1999c [Uttarakhand].

20.7 *kalatopense* Mani & Saraswat, 1973 [Himachal Pradesh].

20.8 *kamathi* Mani & Saraswat, 1973 [Himachal Pradesh].

20.9 *manaliense* Hayat & Anis, 1999c [Himachal Pradesh].

20.10 *anantanagana* Narayanan, 1961 [Jammu & Kashmir].

Subgenus *Dorypolynema* Hayat & Anis, 1999c

20.11 *mendeli* Girault, 1913 [Assam, Bihar (Jharkhand), Kerala, Pondicherry, West Bengal. (Australia; Malaysia)].

(Synonyms: *Polynema oophaga* Subba Rao 1970; *Polynema narendrani* Subba Rao 1989).

21. Genus *Pseudanaphes* Noyes & Valentine, 1989

21.1 *sikkimiensis* sp. nov. [Sikkim]. Present dissertation.

22. Genus *Ptilomymar* Annecke & Doutt, 1961

22.1 *dictyon* Hayat & Anis, 1999a [Tamil Nadu].

23. Genus *Stephanodes* Enock, 1909

(Synonyms: *Eustephanodes* Ogloblin, 1967; *Masonana* Yoshimoto, 1990).

23.1 *reduvioli* (Perkins, 1905) [Bihar, Uttar Pradesh, Kerala, Karnataka, Tamil Nadu, Delhi, Himachal Pradesh, Uttarakhand (Oriental; Palaearctic; Australian)].

(Synonyms: *Polynema* (*Stephanodes*) *imbricatus* Narayanan & Subba Rao, 1961; *Polynema ahlaensis* Mani & Saraswat, 1973).

24. Genus *Stethynium* Enock, 1909

24.1 *empoascae* Subba Rao, 1966 [Delhi, Karnataka, Uttar Pradesh. (Australia)].